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NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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Views on Colloidal Fuel

On another page we publish the substance of a paper on "Colloidal Fuel" read by Mr. Linton Bates at a meeting on Tuesday evening of the Institution of Petroleum Technologists at the Royal Society of Arts. As a popular statement for a lay audience, or as an article for some such popular science periodical as the *Scientific American*, Mr. Bates's paper would have been admirable. As a scientific contribution on a subject which, to put it mildly, is not entirely unknown to British investigators, we fear it must be said that its value is not high. It contained, as far as we can judge, little or nothing not already known to experts, and the confident claims put forward on behalf of colloidal fuel were received with a very marked reserve by the audience. Much the same may be said of a second paper, accompanied by

diagrams and curves, contributed by Mr. Haylett O'Neill. We are giving the substance of Mr. Bates's paper because, for one thing, it illustrates the contrast between the rather free-and-easy light-hearted manner in which our American friends state a scientific case, and the severe thoroughness and reserve with which the British scientist, on such occasions, ignores or takes for granted what is commonly known among experts, and confines himself to saying something scientifically new or saying nothing at all. We hope it is not discourteous to say frankly that both contributions were disappointing. They were popular and highly coloured where one had looked for simple scientific exactness; there was over-confidence about the claims where an under-statement might have been more convincing.

Some strong, though not unfriendly, feeling has been aroused by these papers among people who are rightly jealous of the standards set by our learned and scientific societies. Several interesting opinions on the point have already reached us. We give as a sample of what is thought on the point the following notes by one who was present. They are frank, but not more so, we think, than the occasion needs. "The reading of these papers," our contributor states, "occupied from 5.30 until 7.15, so that any question of full discussion was rendered impossible. As several speakers stated in their brief remarks at the conclusion the bulk of the material presented was merely of a popular nature and not of the sort which one expects to hear when attending a technical or scientific institution's meeting. It is a pity, because the subject is one of very great importance and, as one of the speakers added, there is no doubt whatever as to the valuable service which has been rendered by Mr. Bates to the whole movement towards the utilisation of fine coal in conjunction with oil with a view to extending an oil supply which is all too small for the calls made upon it. There are so many problems in connection with the question which are capable of and require scientific discussion that it seems a waste of time to deal with those aspects of the question which were chiefly touched upon on Tuesday night.

"It is permissible," he continues, "to ask what view the Publication Committee of the I.P.T. take of such papers. The paper read before the previous meeting of the Institution was much more suited for general audiences of the Royal Society of Arts rather than for a technical society, but it did, at any rate, bring confirmation upon views that had been frequently expressed elsewhere even more fully on questions of broad importance by a man of eminence. These papers, however, would certainly not appear to be of a type which should be read before a chartered

technical institution. The majority of the arguments put forward were applicable to mere mechanical mixtures of coal and oil as much as to the so-called colloidal mixtures. The bulk of Mr. O'Neill's paper was rightly described as a series of exercises in the rule of three. It would surely have been sufficient to have said that since coal and oil do not interact, the properties such as specific gravity, heat value, specific heat, and, to a large extent, viscosity, are proportional to the relative amount of the ingredients contained in any mixture. The bulk of the paper was simply a wordy extension of this aspect of the matter. No attempt whatever was made to explain the mechanism of the process whereby it was possible to support comparatively coarse particles in liquid oil.

"The interesting fact was brought forward that so-called colloidal coal-oil mixtures had a much lower flash point than the original oil employed in mechanical mixtures, but no effort was made to show that experiments had been done with a view to finding out if similar results might not be obtained if coal, finely powdered, were merely mixed with the oil. It is probable that this is merely a surface adsorption effect, in which case the benefit arising from it would equally apply to merely mechanical mixtures. The question of viscosity which gives a very great insight into the behaviour of colloidal mixtures or suspensions was illustrated by one series of curves, whereas from the theoretical standpoint this is a matter which should have received full and complete treatment. It must be repeated that it is unfortunate, to say the least, that this important subject should have been dealt with in such an unsatisfactory manner."

The Responsibility of Authors

It is a truism that the technical man who intends to excel to-day is not necessarily he who carries in his head all the details associated with his own and cognate subjects, but the man who knows instinctively where to lay his hands on the information he requires. To take, for example, the science of industrial chemistry, in its present stage of diversity, no single individual could possibly lay claim to omniscience; and, perhaps, one of the most precious assets which many—but not all of us—possess is a knowledge of our own limitations. So long as chemical and engineering science continues to be so involved, so long must the majority of us continue to rely for information without the scope of our daily round upon established reference books and papers.

The thorough man to-day finds part of his essential equipment in card-indexes and files, coupled with a comprehensive library containing not only modern text-books, but the proceedings of various societies and copies of the weekly technical journals. In a sense, the intricacies of scientific evolution have outstepped the receptive capacity of the human unit, so that it has now become a question of relying upon others for much of our information and many of our facts. When in doubt upon any particular subject we turn to the work of the recognised authority on that subject, accepting his verdict as more or less final; and, possibly, committing ourselves under his in-

fluence to some considerable expenditure. Under the circumstances, it is a fair question to ask whether the average modern author, when he aspires to write with authority, is fully alive to the responsibility which he incurs? In the chemical industry we are by no means all endowed with a superfluity of wealth, and in many cases have to content ourselves with a single text-book on a particular subject, while many are not conveniently placed within reach of an exhaustive library. Accordingly, facilities for drawing a comparison between the views of one or more authorities are frequently limited.

The period since the termination of the war has been remarkable in two directions. Firstly, for the host of text-books which have been turned out on all manner of technical chemical subjects, and, secondly, by reason of the fact that the majority of those actively employed in the chemical industry have never had so little spare time. In view of the latter consideration, it is difficult to understand how this output of literature has been possible, and one is tempted to draw the conclusion that many recent text-books have not had bestowed upon them the time and careful attention which is necessary for the protection of those who look to them for an expression of the best ascertained knowledge. One erratic text-book out of twenty on the same subject may be responsible for the difference between success and failure in a scientific operation, and it is to be trusted that those who have new books or the revision of earlier editions in view will feel that they have "something to debate with their consciences."

In the dissemination of reliable and accurate information a start might be made with the collocation in accessible form of various chemical, physical and engineering data which, as they exist at present, have been described as "woefully deficient and fragmentary." An American professor recently speaking on the subject remarked upon the sad lack of really useful tabulated information, and truthfully stated that, in so far as thermo-chemical data are concerned, a whole corps of competent thermo-chemical experimenters could be kept busy for years in the compilation of every day information at present unavailable and badly needed.

The Properties of Lime

EXPERIENCE shows that familiarity breeds a certain amount of neglect so far as the use of the more common and less expensive raw materials employed in the chemical industry—or for that matter in any other industry—are concerned. It has frequently been said that the low price at which coal could be obtained in the past was mainly responsible for the manner in which it has been squandered, and it has needed the stern lessons of the past few years to bring home to us the necessity for a radical change in our methods of fuel consumption. Coal, however, forms but the chief item in a long list of abuses, and the imagination need not be carried very far to see that on the majority of works there are many other more or less commonplace materials which are misused as if their cost were a trivial matter. A good example, perhaps, is ordinary lime which has immensely increased in

value since 1914, and which is essential in the operation of many chemical processes. Limestone, quicklime, and hydrated lime are all used to a large extent as chemical reagents in the manufacture of other materials, and the importance of the financial saving which may be effected by employing such substances in the most economical manner has so appealed to the United States Bureau of Mines that it has issued a special circular (No. 30) giving general information on the subject. The circular, as a matter of fact, is one which should be in the hands of every works chemist, for eighteen of the most important chemical industries which use lime are enumerated and dealt with.

In some of these industries the quality of the lime is, it is pointed out, of minor importance, while in others the use only of one of the three above-mentioned forms is satisfactory, and the quantity and nature of the impurities which the material may contain are specified. Since natural limestones contain more or less magnesia, iron, silica, &c., the quality of the lime obtained from them essentially depends not only upon the nature and amount of these foreign substances, but also upon the manner in which the limestone is burned. As a material for building purposes it may be noted that hydrated lime is to be preferred to quicklime, owing to the fact that it eliminates the labour usually entailed in slaking. In this country the material as delivered is seldom subjected to any test other than that for the determination of inert matter, but the Bureau of Mines recommends that, according to the purpose for which it is required, it should be tested for rate of hydration, plasticity, complete chemical analysis, time of set compressive strength, and fineness. Perhaps, the most interesting portion of the circular is that which gives a brief but most concise description of the industries in which lime is employed, showing exactly why and how it is used, and the quality best suited to each process.

Dyestuffs and Chemical Warfare

THE answers given by the Prime Minister in the House of Commons on Monday to questions relating to the dyestuffs position give very little indication of the Government's real intentions in this matter. First of all, Mr. Lloyd George admits that no agreement has been reached between manufacturers and consumers, to say nothing of merchants, as to the legislation needed to meet the situation. If this is so, there is the more point in the suggestion that the Board of Trade should without loss of time convene a representative conference of the interests affected, with a view to some kind of agreement being reached. The Prime Minister was also vague in his references to "certain pledges" which have been given by the Government in regard to the protection of the home dyestuffs industry. We should, of course, expect pledges given by the Government to be honoured; what people are mainly interested in is the form in which the pledges are to be carried out. Except for the previous announcements made by Sir Robert Horne that the most effective plan is the prohibition of imports, subject to a licensing system, no one knows what is likely to happen. This uncertainty cannot be good for any section of the dyestuffs industry,

and whether the Government proposals are good or bad it would, at least, be some relief to know what they are.

As regards chemical warfare the tendency seems all in favour of its development. It will be governed by the same considerations that determined the building up of huge armaments against the contingency of war. It is another form of the principle of two keels to one. That may, indeed, have been our salvation in the war, but it would be lamentable if, before the war has been cleared up, we begin another competition in the invention and output of destructive appliances of a more deadly kind than those hitherto employed. If chemistry must be debased to warfare, then our chemists will no doubt give a good account of themselves. What is to be deplored is the fatalist assumption already that another war is inevitable, that chemistry will be more largely utilised than ever, and that we set our best research men hard at work on the discovery of new chemical horrors. There is really no safeguard here against war, but rather a sure preparation for it. The statesmanship civilisation needs is that which would go to the roots of international misunderstanding and aim at co-operative action to guarantee the future peace of the world.

The Calendar

Nov. 22	Chemical Association: "Industrial Applications of Catalysis," by E. F. Pearson. 4.30 p.m.	Royal College of Science, Dublin.
23	Association of Metallurgists & Metallurgical Chemists: "Refineries for Electric Furnace Use," by W. J. Rees.	Sheffield.
23	Institution of Petroleum Technologists: "Estimation of Sulphur by the Lamp Method," by F. Esling; "Note on the Lamp Method," by J. Kewley; "Analysis of Shale," by E. L. Lomax. 5.30 p.m.	John Street, Adelphi, London.
24	Birmingham & Midland Institute: "The Katharometer," by G. A. Shakespear.	—
24	Institute of Chemistry of Great Britain & Ireland: "Some Scientific Aspects of Tanning," by J. T. Wood.	University College, Gower Street, London.
25	Society of Dyers & Colourists (West Riding Section): "The Standardisation of Dyestuffs Intermediates," by E. Fyleman.	Yorkshire.
25	Manchester Municipal College of Technology (Dept. of Applied Chemistry): "The Cooling of Fluids," by H. M. Dunkerley. 6.30 p.m.	Manchester.
26	Royal College of Science Union: "Glow Lamp Filaments," by A. Stevenson.	South Kensington, London.
26	Society of Chemical Industry (Manchester Section): Annual Dinner. 7 p.m.	Grand Hotel, Manchester.
29	Royal Society of Arts: First Cantor Lecture, "Micro-organisms" and Some of their Industrial Uses, by A. C. Chapman. 8 p.m.	John Street, Adelphi, London.

The Application of Pyrometers to Foundry Work

By W. Bowen, A.M.I.Mech.E., A.M.I.E.E., &c.

THE second meeting of the session of the Lancashire Branch of the Institution of British Foundrymen was held at the Manchester College of Technology on Saturday, November 6, Mr. W. H. Meadowcroft presiding. There was a very large attendance of members.

Mr. W. BOWEN (Foster Instrument Co., Leeds and Letchworth) read an interesting paper on "The Application of Pyrometers to Foundry Work." He said that very careful means of control were necessary in modern methods of foundry practice. In earlier days the provision of scientific instruments was considered a luxury, and while such instruments might have been used occasionally great reliance was placed necessarily upon the individual judgment and skill of the operator. In more recent times, however, the greater demands for a higher quality of finished products, the cutting down of dimensions to more scientific designs, the multiple production of goods, the high cost of labour, materials and fuel, had all resulted in an endeavour to obtain the last ounce of strength in the materials and in the products manufactured, and in order to secure this last ounce of strength, checking and gauging within narrow limits now obtained at all stages in nearly all processes.

The first step to successful production was nowadays the provision of suitable gauges and scientific apparatus. While great reliance was placed upon the skill of the foundry worker in the days when pyrometers were not available, it must not be understood that such skill was not required at the present day, or that the use of the pyrometer was intended to replace such skill. Under former conditions the foundryman was working more or less in the dark, without any guidance but that of colour to guide his judgment of temperatures, and he might easily be 100 deg. out of truth in his endeavours to repeat his operations. The pyrometer assisted the operator's skill and judgment, and lent certainty to his work.

To achieve valuable results the pyrometer must be in practically continuous use, be capable of withstanding rough usage, be simple and quick in operation, and require little or no manipulation. The details and requirements of the work controlled must have careful attention, and the instrument must be properly fitted to the process. A pyrometer giving excellent results in one process, or under one set of conditions, might easily be an utter failure under different conditions of usage. Accuracy was, of course, essential, even if there were rough treatment, and the pyrometer should be of such a type that any ordinary workman of intelligence could take temperature readings with it.

Temperatures and Effect of Heat Treatment

In contrast with former times, when very little was known about temperatures and the effect of heat treatment, it was now possible to obtain pyrometers of exceedingly great accuracy and refinement of readings. Power of fine discrimination in temperature readings was frequently very valuable under certain conditions—i.e., in laboratory research work, &c., but as regards workshop practice the refinement of temperature readings should be compared with the refinement of temperature control possible in the furnaces and the material under treatment. It should also be compared with the continued accuracy of the readings. For instance, it would be foolish to install a pyrometer, reading every degree, on a furnace which could not be controlled within 20 deg.; or, again, if the works conditions did not allow accuracy to one degree in the use of the pyrometer then confidence in the temperatures to one degree would be misplaced. This warning was very necessary, for there were many technical men—some of high reputation in metallurgy—who considered that they were able to obtain temperature readings correctly within 5 deg. on a molten stream of steel, and that pyrometer makers should exert their efforts into producing a works pyrometer to read temperatures of 1,500-1,600°C. within 2 deg.

The day might come when it would be possible to rely upon temperature readings under commercial conditions within a single degree, right up to 2,000°C. and over, but to be of practical value that refinement and accuracy must go hand in

hand with equal refinement in the control of those temperatures. At the present stage, the commercial class of pyrometer was in advance of the latter in those respects.

In regard to robustness the present-day pyrometer showed a great advance over the older types, and this factor had encouraged the application of pyrometers to processes where hitherto application was impossible on the score of delicacy. Many instruments had been applied to locomotive and marine work, and they had successfully withstood the excessive jolting and vibration.

Modern furnaces were capable of great accuracy of control, both as to temperature and atmosphere, and modern alloys, both ferrous and non-ferrous, were capable of high service and efficiency when subjected to proper heat treatment. This superiority was sacrificed unless the temperatures were properly controlled at all stages of manufacture, from the first melting of the metal to the final treatment of the product. As an instance, Mr. Bowen mentioned that the ductility of modern brass and aluminium alloys had been found to be beyond all earlier expectation after these alloys had been subjected to proper heat treatment, and drawing and pressing operations had, in consequence, increased in rapidity, while the quality of the finished product was much higher than formerly.

Another interesting point mentioned by Mr. Bowen was that eight months previously he was called in to advise a firm regarding the proper annealing of malleable iron castings. Before installing pyrometers, the furnaces took an average of 24 hours to heat up; after installing the pyrometers the heating up was reduced to six hours, with a resultant saving of fuel of about 25 per cent. to 30 per cent., an increase of 25 per cent. in production, and a reduction in rejections from 20 per cent. down to less than 5 per cent. Since those figures were given by the firm in question a further improvement had been experienced.

Field of Pyrometry

The field of pyrometry as applied to foundry work mainly consisted in:—

- (1) Core-drying stoves.
- (2) Casting of iron, steel, and ferrous metals.
- (3) Casting of aluminium, brass, bronze and other non-ferrous alloys.
- (4) Annealing of castings, steel castings, malleable-iron castings, &c.

In these various applications, the types of pyrometers in use fell naturally into two classes: (1) The "contact" or "immersion" type, since one part of the pyrometer was "immersed" in the source of heat to be measured; and (2) the "distance" type, in which no part of the pyrometer was immersed in the source of heat. The simplest form of the first type was the mercury thermometer, which could be applied to taking temperatures up to about 500°C. It could be used for taking temperatures of core-drying stoves, but was not an ideal form of instrument for workshop application, as it did not fulfil the condition of robustness.

Mr. Bowen then explained the form of construction of the Thermo-Electric Pyrometer. This type of instrument consisted of two dissimilar metals in the form of wires at the tip of which was a rod enclosed in a protecting tube. This was the portion of the instrument which received the heat and was termed the "hot junction," while the other end of the two wires, outside the source of heat, was called the "cold junction." The temperature was recorded upon an indicator. The temperature was registered by a thermo-electric pyrometer was really the difference of temperature between the "hot" and the "cold" junctions. The metals used were, according to type, platinum-rhodium, iron-nickel, platinum-iridium, &c. Nickel-chromium alloys gave the highest electro-motive force in commercial use, and were valuable for temperatures up to about 1,360°C.

The principles of radiation, or optical pyrometry, the electrical resistance thermometer, and the Hoskin's Alloy Thermo-couple were also explained, as well as foundry operations in the case of both non-ferrous and ferrous metals and the application of pyrometry to the same.

Treatment of Pyrometers

It was important to remember that the electrical circuit of a pyrometer should be protected as carefully as that of the lighting or power service. Metallic connections should be kept clean, free from oil and dust, because the voltages employed in electrical circuits were only a small fraction of those of lighting circuits, and consequently the presence of any metallic oxide or dirt upon a contact would produce greater disturbing results.

In all installations, and particularly in large installations, and in those doing hard and continuous service, frequent checking of accuracy was necessary. The maintenance cost of a pyrometer in continuous work was necessarily a high proportion of the first cost. The life of the immersed portion of the Contact Pyrometer, for instance, should be compared with furnace linings, melting pots and similar materials which were, like the pyrometer, subject to the destructive action of the process. Any portion of a pyrometer which was subjected to high temperatures should be provided with adequate protection to secure continuity of its life, and provision made for replacing the parts destroyed by the heat.

Mr. Bowen afterwards replied to certain questions put by Messrs. J. Pell, Haigh (Wakefield), Gill (Horwich), Sherburn (Warrington) and Leigh (Manchester).

Ethyl Chloride as an Ethylating Agent

To the Editor of THE CHEMICAL AGE

SIR.—I have noticed in your issue of November 6 a report of a lecture by Dr. Callan on the use of autoclaves, in which it is stated that ethyl chloride was very frequently employed in large scale organic chemical operations as an ethylating agent, and gave rise to very considerable pressures at comparatively low temperatures.

I do not know whether Dr. Callan himself used these exact words as I am dependent upon your report for my knowledge of his lecture, but I should first of all like to correct the tense, and would say that ethyl chloride *is*, and not merely *was*, employed as an ethylating agent to an extent which is hardly realised in this country.

In my paper before the Society of Chemical Industry in December last, I endeavoured to bring home to the chemist and chemical engineer in this country, the circumstances that the properties of ethyl chloride are but poorly understood. The quotation in your journal serves to perpetuate an error which should have been eradicated long ago, namely, the error of assuming that ethyl chloride requires very strong autoclaves in order that it may be used technically.

A reference to the vapour pressure curve of ethyl chloride will serve to show that the vapour pressure at 100°C. is in the neighbourhood of about 160 lbs. gauge, and I can reaffirm what I stated in my paper in December that practically every commercial ethylation can be accomplished with ethyl chloride very expeditiously at this pressure, and that the foolish practice of carrying out the ethylation at temperatures in the neighbourhood of the critical temperature of the ethyl chloride should have disappeared long ago.

If Dr. Callan's experience is in accordance with his remarks, I can only say that the processes adopted by him are unsatisfactory, and that he still has something to learn about the properties of ethyl chloride, and would recommend him, and those of your readers who have noticed the observation in question to read the portion of my paper on this particular matter.

It is my experience that most of the chemists and chemical engineers in this country do not understand the properties of ethyl chloride, and do not understand how readily and expeditiously it may enter into industrial processes, and I would say that the autoclave pressure bogey appears to be very difficult to kill.—I am, &c.,

ALBERT HENNING,
Chairman and Managing Director,
Hedley & Co. (Leytonstone), Ltd.,

[Before publishing this letter we thought it due to Dr. Callan to let him see a copy. His comments are published below. As to Mr. Henning's correction of the tense of our report, he is evidently less familiar than Dr. Callan is with the well-known newspaper rule which serves to distinguish between verbatim and summarised reports. If he will spend half an hour in studying *Hansard* and

comparing its reports with those in his own daily journal, it may convince him that the knowledge which is proud that it has learned so much is less safe than the wisdom which is humble because it knows no more.—ED., C. A.]

Dr. Callan's Reply

To the Editor of THE CHEMICAL AGE

SIR.—I have to thank you for your courtesy in allowing me to see a copy of Mr. A. Henning's letter prior to publication. In reply to Mr. Henning's criticisms I have to say in the first place that I actually used the present tense in referring to the use of ethyl chloride as an ethylating agent, but your reporter in reporting my lecture in the third person has also used the past tense—both when referring to the use of ethyl chloride and when referring to the pressures of aqueous caustic soda immediately preceding. I have no objection to raise to this as the meaning seems perfectly clear.

I do not think there was anything in my lecture or in your report, which I gladly acknowledge as an accurate account, which, to use Mr. Henning's expression, "perpetuates the error of assuming that ethyl chloride requires very strong autoclaves in order that it may be used technically."

I stated, as you correctly report, that ethyl chloride gave rise to very considerable pressures at comparatively low temperatures—a statement which is literally correct.

I note with interest Mr. Henning's statement that practically every commercial ethylation can be accomplished with ethyl chloride very expeditiously at about 100°C. and about 160 lbs. gauge, and am quite prepared to admit I have still something to learn about the properties of ethyl chloride if this is the case.

I have to learn, for example, how to ethylate *alpha*-naphthalymine very expeditiously at 100°C. on a commercial scale by means of ethyl chloride, a process which presumably would be easy for Mr. Henning to carry out.

It may be, as Mr. Henning says, that most of the chemists and chemical engineers in this country do not understand the properties of ethyl chloride, but my opinion is that these properties are quite well understood in most cases, and it is just because of this that ethyl chloride is not looked upon with any special degree of favour as an ethylating agent, in spite of the efforts of manufacturers to advertise it on all possible occasions, as Mr. Henning's letter illustrates.—I am, &c.,

Higher Crumpsall, Manchester.

THOS. CALLAN.

November 15.

Wedding of Captain Wedgwood Benn, M.P.

THE wedding took place on Wednesday at St. Margaret's, Westminster, of Miss Margaret Eadie Holmes, daughter of Mr. Daniel Turner Holmes, lately M.P. for Govan, and Captain Wedgwood Benn, D.S.O., D.F.C., M.P. for the Burgh of Leith, and second son of Sir John Benn, Bart. The ceremony was performed by the Bishop of London, assisted by the Rev. H. F. Westlake, the Minor Canon of Westminster. The bridesmaids were Miss Hermione Holmes (sister of the bride), Miss Sylvia Hughes, the Misses Betty and Julia Benn (nieces of the bridegroom), and Miss Janet Scott-Eadie. The page was Master Peter Pain (nephew of the bridegroom). The best man was Mr. E. J. P. Benn, C.B.E., brother of the bridegroom.

There was a very large and distinguished company at the ceremony, and afterwards at a reception at the Hotel Cecil. A large number of personal and public presentations were made, the latter including gifts from the Burgh of Leith, the Provost of Leith, the Leith Education Authority, the Leith Dock Commission, the Independent Liberal Members of Parliament, the London Liberal Federation, the Liberal Headquarters' Staffs, Liberal, Conservative & Labour Friends from St. George's-in-the-East, the South Edinburgh Liberal Association, the Whitechapel and St. George's Liberal Association, the Staff and Workers connected with 38, Parliament Street, and the Staff of Messrs. Benn Brothers, Ltd.

We regret to announce the death of Mr. F. A. Petri, the senior partner of Petri Brothers, of 39, Lime Street, London, E.C., which occurred on the 4th inst., from heart failure, after a very brief illness. The firm will be continued as hitherto by the remaining partner, under the management of Mr. H. Symonds, who has been with the firm for 33 years.

The Case for Colloidal Fuel

By Lindon W. Bates, F.R.G.S., A.I.C.E., &c.

Before a crowded and expectant audience at the House of the Royal Society of Arts, on Tuesday, the important subject of colloidal fuel was dealt with by two American technologists in papers read before the Institution of Petroleum Technologists. Sir Frederick W. Black occupied the Chair. The Colloidal Movement was demonstrated by cinematograph, and there were other lantern illustrations. "Colloidal Fuel" was the title of the first paper, which was read by Mr. Lindon W. Bates, of New York. This was immediately followed by a paper on "Properties and Characteristics of Colloidal Fuel," by Mr. Haylett O'Neill, also of New York.

In the course of his paper Mr. Bates said that a fuel, to be atomizable and for its components to be simultaneously combustible, it was necessary that the fuel be mobile, and that it should enjoy adequate stability for storage and for use in a given temperature-range, and for enabling it to pass through the pipes, preheater and other apparatus-parts, without clogging. The degree and duration of the adequate stability desired varied according to the contemplated handling and use of the fuel. For marine and industrial uses, the character might be coarser than for internal combustion engines. For some purposes a few minutes of stability were alone required. This was the case when the fuel was burned directly after preparation. For other purposes, as when storage was intended, stability not merely for some days, but even for months might be desired. To give the utility character required, it was essential to prevent or delay the settling to the bottom of the medium or floating to the top of the minute portions of dispersed substance for a reasonable length of time and to a reasonable extent, depending in duration and degree upon several variable factors. These included the length of proposed storage after manufacture and the type of combustion, conveying and spraying systems. While an unstabilized composite was of doubtful utility, save under very exceptional circumstances, prolonged stability was not necessary for the practical utilisation of the fuel. Occasional movement in storage or after prolonged standing to promote a new cycle was not a hardship. Stability for a month or two was ample for nearly all purposes.

The problem, therefore, had been to bring equality or approximate equality to the two sides of Stokes's well-known equation, modified to allow for the non-coincidence of the factors in hand with the theoretical factors upon which Stokes's Law was predicated. In order to achieve adequate or relative stability of the particles in the medium so as to permit continuous spraying without the need of constant agitation, an equilibrium of the various forces in the composite was necessary. The velocity of the ascent or descent of the particles, droplets or minute bubbles had to be brought to zero or nearly thereto for the viscosity range of the medium corresponding to the temperatures of storage and best preheat. Internal conditions had to be established or modified whose combined results would be to neutralize temporarily or permanently the effect of gravity. The time had come, and the occasion was appropriate, to disclose in broad outline a few of the several ways in which this might be and had been done.

The Problem of Stability.

A number of distinct or distinguishable methods of achieving stability had been evolved. Three only of these—not necessarily the preferred methods—would be now listed: First it was possible to stabilise particles by the use of certain protective substances. Soap solutions might be mentioned. Some of these were operative not only upon colloidal coal in oil but also upon particles in size far above colloidal dimensions. Of the fixateurs, a typical substance was a variety of lime-rosin grease, specially prepared, in which lime, rosin and water were incorporated with heat and circulation into an oil carrier. Second, it was possible to peptise bituminous coals and some other solid carbonaceous substances, to a limited but sufficient extent for stabilising purposes, by the addition of percentages of coal distillates, such as tars and the middle fractions, and by subjecting the mixture to a special heat treatment below the flash-point temperature. Third, by intensive grinding, it was possible to reduce coal to colloid size, or practically so, and thereby to achieve the stability inherent in smallness of dimension. These and other measures were readily combined so as to adapt the stabilising treatment to the specific gravities, surface tensions, viscosities and association tendencies of the several ingredients. It was entirely possible to stabilise in

mineral oil in readily liquefiable form up to 55 per cent. of foreign substances divided between the liquid and solid ingredients derived from coal. A very suitable fuel consisted for example of 30 per cent. coal, 10 per cent. coal tar distillate and 60 per cent. fixated mineral oil.

The percentage of particles which might settle out during the life of the composite, depended upon the treatment given. The first colloidal fuel made for the U.S.S. *Gem*, carrying 31 per cent. Pocahontas coal in fixated navy fuel oil, was used and tested on that vessel for more than five months. At the close of three months the small settlements were stirred into oil thereby renewing its "life." Since those early days the fuel had been materially perfected. Thus, with regard to grade 15 carrying 38 per cent. mixed coal and coke stabilised in fixated Mexican oil, Messrs. Dow & Smith, of New York, well-known chemical engineers, recommended by Sir Frederick Black on behalf of the Admiralty, certified after special tests that only 2.6 per cent. of the particles had become destabilised in five months, and that the fuel displayed various colloidal characteristics, such as Brownian movement. Grade 16 of the fuel with 42 per cent. mixed coal and coke stabilised in fixated Mexican oil, was successfully burned eight months after manufacture, during which time the barrels had been exposed in the open air to frost and weather, without any motion treatment other than that necessarily involved in coil heating and removing the material from the barrels.

In regard to the physical characteristics of the fuel the Underwriters Laboratories of the United States National Board of Fire Underwriters undertook a series of elaborate tests extending over six months.

Economic Advantages Claimed.

From the economic point of view colloidal fuel possessed many advantages over fuel oil or coal alone. First, the fire hazard of colloidal fuel was less than that of oil or coal. The specific gravity of a composite using over about 15 per cent. of coal was greater than unity. If on fire, the flames might be quenched in and by water, and, in storage, fire might be prevented by a water seal. This fact was of cardinal importance as other liquid fuels were lighter than water and could not be so safeguarded. Trials of a water seal had shown that certain grades of the fuel might be so stored for even a year without jeopardising their operative character. Sprinkler systems of fire protection did not lose their utility as they did in plants using oil fuel. The insurance advantage and increased safety of ships and plants due to this fireproofing capacity was obvious. It had been found also by experience that the addition of carbonaceous particles to an oil and the proper association of these components, tended materially to raise the flash-point of the oil and reduce evaporation. It might be that the volatiles of the oil had a preferential affinity for those of the coal or were preferentially absorbed by, or absorbed with, the particles. In any event, colloidalising imprisoned an important part of the volatiles of both. The Report of the Underwriters' Laboratory emphasised this interesting phenomenon. The flash-points of most colloidal fuels varied between 250° and 280°F. There was therefore, far less risk in the handling and utilisation of colloidal fuel than with fuel oil, and it was no longer necessary, as was the case with many oils, to preheat close to or over the flash-point, to reach the best atomising range. For these several reasons the Fire Council in the United States gave colloidal fuel a preferred rating over fuel oil and the new liquid combustible was admitted by the Board of Standards and Fire Chief more willingly than oil for combustion use in the City of New York.

Second, the good grades of colloidal fuel possessed more British Thermal Units per volume than either of its principal components separately. This was due to greater specific

gravity. The addition of coal or tar was by no means an adulteration of oil. It might be an enrichment. For example, using 65 per cent. oil of 18,500 British Thermal Units per pound which was 177,600 British Thermal Units per Imperial gallon and gravity 0.96 with 35 per cent. bituminous coal of 14,000 British Thermal Units per pound and 1.4 gravity, the resulting colloidal fuel was heavier than water and had 182,800 British Thermal Units per Imperial gallon. A special grade of navy fuel using crude oil coke of 15,000 B.T.U. and density of 1.8 would have 198,600 B.T.U. per Imperial Gallon, or 12 per cent. more than the oil. This meant that where storage space was of importance and weight of lesser moment, greater heating capacity and steaming radius might be obtained by using the composite than by using oil alone and much greater than by using coal.

Third, colloidal fuel might be prepared having greater combustion efficiency than straight oil. This was true of peptized mixtures and might be explainable by the probability that the liquid film on the outside of the particle gasified first, and that which penetrated the seams and cavities of the coal gasified next in the combustion chamber, thus exploding the particle. The areas exposed to oxidation were thereby made greater than the surface even of sprayed liquid droplets or of coal particles. There was also an advantage due to the fact that the hydrogen content was less than that of oil. Grade 14, with 30 per cent. coal and 12 per cent. coal distillates suspended in pressure still oil, displayed a marked advantage in an eight hours' regulation test made in April, 1919, over Mexican topped oil tested under the same conditions. The ordinary grades of colloidal fuel showed heating efficiencies per million heat units substantially equal to those of standard fuel oils, as numerous regulation tests had shown. Even on a poor boiler, the poorest grade made with 38.5 per cent. of anthracite rice containing before incorporation 25½ per cent. ash equalled in result the tests of handpicked Pocahontas coal on the battleship *Wyoming* with a modern equipment of water tube steam generators.

Fourth, colloidal fuel might be used in the usual oil-burning installations without material modification. On the U.S.S. *Gem* the existing oil-firing equipment and Normand Boilers were used with no substantial change. On land boilers at Greenpoint, New York, practically no preliminary mechanical adjustment was necessary. Several varieties of mechanical and steam burners had been used. If long storage was intended, the tanks might be equipped with a current-producing apparatus, and, as with heavy oils, there should be a heating coil in the tank to give the fuel a desired fluidity before pumping to the preheater and burners. Colloidal fuel, carrying up to 40 per cent. of carbonaceous particles, was practically the equivalent, in regard to handling to the preheater stage, of the heavier class of fuel oils. At higher temperatures, however, such as obtained in the preheater, it might approximate the behaviour of the lighter class of oils. The burning of liquid colloidal fuel required simply the procedure in burning fuel oil. To use the pastes, however, it might be necessary slightly to modify the installation and increase the pressure to move the fuel to the burner. In the case of a gel which was liquefied by pumping, or which liquefied in the preheater, more pressure was apparently alone required. While at normal temperatures colloidal fuel was like a heavy Mexican oil, it handled as well as oil with the usual preheat. Dr. S. E. Sheppard, in a valuable comparison of "Colloidal Fuel and Navy Fuel Oil Specifications," had aptly attributed this to the fact that "Colloidal Fuel has a much higher temperature-viscosity-coefficient than straight oil fuel." Due, no doubt, to its content of solid particles. The specific heat of colloidal fuel was about 0.4, that of fuel oil 0.5. A less number of preheat units would, therefore, properly liquefy the composite. About 160°F. to 220°F. was used, depending upon the circumstances. Mexican oils now often required a preheat in excess of this figure. Colloidal fuel might be transported in tank cars and through pipe lines. The art of heating, piping and pumping heavy liquids had been solved in America.

Fuel Economy.

Turning to the aspects of material economy, it was clear that a very important saving in fuel supplies might be effected by colloidalizing coals and oils. It was possible to use the fine-mesh sizes of coals and cokes with oil and tar to make

liquid fuel instead of briquettes. Thereby the product might be sold on a liquid fuel basis, and the better efficiency of a liquid over a solid fuel might be duly obtained. Further, by de-ashing coal and colloidalizing the purified product the contents of the waste-coal heaps and of poorer coal veins might be utilized to advantage. Even without ash removal, high-ash coals might be used, as the oil in the fuel averaged down the ash content of the final product. If oils were colloidalized with coal, a given supply would stretch further, thus relieving ship and rail transport and rendering more refinable oil available for the lubricants and for aeroplane and motor spirits.

Since colloidal fuel provided a new market for the less valuable or unmarketable coal distillates and for coal and coke breakages, the owners might carbonize their coal instead of selling it raw, and thus obtain the valuable by-products. Furthermore, coals and lignites might be used without complete dehydration, since in colloidal fuel a small or moderate percentage of emulsified and stabilized water did not materially reduce the efficiency of the remaining heat-units.

Owing to the availability of relatively inexpensive sources of carbon in the form of fine mesh coals, coke breakage and de-ashed coals, the composite might compete in most places with straight oil, in view of the nature of the stabilizing treatment and the available methods therefor. The process was low in cost, and could be fitted to the economic situation of a particular locality. The modest expense of manufacture could not neutralize the economy offered by the cheaper carbons. Here, unless the price of oil should fall to about 50s. a ton, colloidal fuel could compete with it in cost. Oil now sold at 250s. a ton. Oil would never again be inexpensive.

The apparatus necessary to make colloidal fuel was standard. A modern cement plant was somewhat similar to it in simplicity and arrangement. For intensive grinding special mills were needed, but to make the usual brands of colloidal fuel any standard coal-pulverizing mill might be adapted to the new use. An ordinary paint mill was first used. Then a single, and later a double, Fuller coal-pulverizing ball-mill was employed. Then a simple ball-mill was considered. To-day the Smidth, Marcy or Newell combination tube mills were deemed superior owing to their adaptability to liquid grinding of coal in oil, which again was a new and interesting science because of the influence of temperature and the different mechanical and physical phenomena which distinguished liquid from dry grinding. The equipment to make the fuel was compact, readily installed, of moderate initial cost and of low operative expense.

No Discussion

Unfortunately there was no time for discussion. The Chairman said he thought as the hour was late and no doubt many present would be eager to express views on the various points raised, the discussion might be deferred until an evening could be specially devoted to that alone. There was an evening in the Institution's programme free, and he would consult the Council with a view to making suitable arrangements.

In proposing a vote of thanks Mr. Anflogoff expressed the view that despite the late hour he thought something should be said with regard to the somewhat extravagant claims put forward by the readers of the papers in their support of colloidal fuel. If nothing was said and the papers were published it might be taken for granted by many that the Institution accepted all that had been said, whereas there were quite a number of points which at least were debatable.

Dr. Ormandy was also of the opinion that at any rate the meeting should not break up without a clear understanding that the papers they had heard read were not expositions of altogether entirely new discoveries in science. Although the authors of the papers had made claims he thought some time should be given for discussion of them. As far as the scientific aspect of the subject had been dwelt upon he thought the contents of the papers might be summarised as "the rule of three."

Professor Brame seconded the vote of thanks, and in doing so agreed very largely with Mr. Anflogoff and Dr. Ormandy. He pointed out that the gentlemen who had come there that evening to tell them something about Colloidal Fuel had in fact done good in laying open for discussion many points about which they were all anxious to know.

Oil and Colour Chemists

Potash Prussian Blues

MR. W. G. ASHTON presided at the meeting of the Oil and Colour Chemists Association on November 11. Two papers were presented but neither author was present. The first was on pre-war K. quality Prussian Blue, by Mr. E. F. Morris.

The author of the paper started off by giving the following two representative formulæ for potash prussian blues: (1) dissolve half a ton of prussiate of potash in 200 gallons of boiling water, run down into the making vat containing 400 gallons boiling water, second run down 1,000 lb. copperas in 200 gallons water on to the prussiate, next turn on steam for two hours, then add 60 lb. chlorate of potash, the temperature being about 85°C., and 5 cwt. vitriol, finally add 500 gallons water and boil. (2) Take the same weights of copperas and prussiate of potash as in (1), but let the water in the making vat be at 60°C., stir for one hour, then add 5 cwt. vitriol as before, make up the total volume to 1,800 gallons, raise the temperature to 80°C., add 52 lb. chlorate of potash and finally 5 lb. bichromate of soda. Blues made according to the first formula, where the white precipitate is not treated with acid previous to oxidation, are known as Chinese blues; those according to the second, where the heating with acid precedes oxidation, are known as bronze blues. Washing by decantation is recommended as a surer process for complete removal of the acid than the filter press, but a final wash in the press is suggested. Drying by a rapid current of hot air is preferred to a vacuum drier, for the reason that it gives a brighter and less cindery product that grinds better into a printing ink. For some Chinese blues the vacuum is impossible, as it greatly deteriorates the staining power, a fact for which there is at present no chemical explanation. Reckoned on the prussiate used, the yield of dry blue for a Chinese blue according to the first formula is put at 83½ per cent., whilst in the case of the second formula it is 80 per cent. Paste blue for paper dyeing gives practically the same yield as Chinese, whilst a special pale bronze known as steel blue yields only 75 per cent. In both latter cases a larger proportion of oxidant is employed. The staining powers of these blues reckoned on the prussiate used, when tested in the normal way with white lead, are identical, the steel blue being stronger than the dry paste blue in the inverse proportion to the yield. On the other hand, steel blue in paste form is weaker, weight for weight, than the paste blue when used to colour paper pulp. A convenient laboratory method for making blues is to mechanically stir with a bent glass rod in a covered dye-pot heated by a paraffin bath. There does not seem much difference between this proceeding and stirring the trial by hand in a basin, but the resulting blues differ, those made as described being like the large scale product, the others being useless as guides to practical results. The most marked difference between any bronze and Chinese blue is in the case of those Chinese blues that lose strength on vacuum drying. One essential for producing a good bronze blue anything like on a large scale is that the colour should be finely ground. Lumps are nipped by the rollers and are apparently decomposed by the high pressure. This explanation of actual decomposition is suggested not only by the appearance during grinding into ink, but by a trial of dry grinding through a large high-speed machine, where soluble prussiate was formed. The most convenient method for analysis is to expose the blue to the vapour of 0.880 ammonia in a desiccator, allow the excess of ammonia absorbed to evaporate, and dissolve in water. This method is superior to boiling with caustic, in that the residue is easily washed and the reversion due to boiling together ferrous oxide and ferro-cyanide is diminished or prevented.

Discussion

The CHAIRMAN said that chemistry did not lead very far in the matter of the manufacture of prussian blue, and although this was a chemical process, he held the opinion that different grades of prussian blue were rather due to variations of physical conditions, which made it very difficult indeed to carry out research work upon the subject on a purely chemical basis.

Mr. F. H. BARRY said he had found some astounding contradictions in the literature with regard to the properties of prussian blue. One writer stated that it was impossible to grind some prussian blues in oil at all. With regard to the author's remarks upon vacuum driers, he himself would have

thought such a system of drying which was so absolutely under control as to pressure, temperature, &c., would produce results better than any other method. He believed it was generally held that one of the causes of prussian blues being hard to grind was that the surface dried so quickly that an outer shell was formed, and he would rather imagine that a vacuum drier would get over that better than any other form. He believed that some authorities maintained that soluble salts in prussian blues were the cause of mysterious colour changes when exposed to light, and especially when ground up with a material such as white lead.

Mr. T. M. TYSON, on the question of grinding, said most printing-ink manufacturers would heartily disagree with the author on the question of grinding and decomposition of the lumps. It was a generally recognised fact that when the printing-ink manufacturer started on bronze blues and intimately mixed them with the particular medium that was being used, he ground the material in the oldest mill in the works and smashed it down in that way first, otherwise it would soon smash the mill, and for this reason he could not agree with the author as to the decomposition of lumps.

Mr. H. DURNFORD said he was recently mixing a tint with a little blue and a little chrome yellow ground up in oils in the usual way to blend it. The tint was perfect, and after the first hundredweight was sent out he had some repeat orders. When he came to make up some new material the blue was an extremely bad one, and it absolutely stained the oil. He could not find out the reason for it, but the only thing he had put it down to was that he had used some dammar varnish in which there was an acid that caused the blue to go soluble. His main object in coming to the meeting had been to ask what was the easiest method of finding in the laboratory the difference between a soda and a prussian blue. Samples were often sent from the head office to the laboratory with a request for information as to which was the best to buy, and if anybody could help him in this he would be much obliged.

Mr. W. ALLSEBROOK, speaking with regard to the question of the determination of strength of prussian blue, said he did not think anybody could tell simply by rubbing out the white alone. As an Association, they should set to work to standardise some tests for determining the relative values of the blue.

The CHAIRMAN said he had always regarded Chinese blue as being more suitable to the paint trade and bronze blue as more suitable for the printing-ink trade, and he did not think the question of manufacture came into the question at all. The author had also mentioned the necessity for covered vats, but, personally, he could not see any advantage in having the vat covered, unless it was that rather more economical boiling might be obtained in that way. Prussian blue was one of the most difficult things to wash, and decantation was the only satisfactory method, although even then it was impossible to wash out the whole of the acid. Therefore, the best method was decantation as far as possible with further washing in a press. He agreed that gravity pressing was the only satisfactory method. He had tried all sorts of methods of pumping blue through a filter press, but it was a very unreliable method. There was a big strain on the pump and the cloths, which were always bursting. It was a strange thing that bronze blue or Chinese blue could not be satisfactorily dried in a vacuum drier, but it was the fact that a honeycombed coky mass was obtained. Most of them would be glad to know of an absolutely reliable method of making prussian blue which could be guaranteed not to float out in oil. There were fairly reliable methods of making prussian blue, but there was also a risk of floating out in oil which it was very difficult indeed to overcome with any degree of certainty. He had found that laboratory experiments were of little value in the practical manufacture of prussian blue. The different results obtained in the manufacture of prussian blue were due almost entirely to the size of the plant and the shape of the plant. He had carried out a certain recipe in certain works and got certain results month in and month out, but when he took that recipe to another works with a different plant he could not get the same result. The manufacturer depended more than on anything else on the nature of the plant, the pressure of the steam and the size of the coil, and an old German foreman whom he had a good deal to do with at one time had said that he could only make

a certain grade of prussian blue when the sun was shining and another grade on a foggy day. That, perhaps, was exaggerated, but there was an element of truth in it.

Chia Oil v. Linseed Oil

In a paper by Mr. Henry A. Gardner, of the Paint Manufacturers' Association of the United States, some tests were described of Chia oil, the use of which was suggested in place of linseed oil. Chia grows in Mexico, and Mr. Gardner, having secured 100 kilos of the seed, gave the following particulars of the results of his tests upon the oil: Weight of seed expressed, 206 lbs.; weight of oil obtained, 46 lbs.; weight of cake, 160 lbs.; total oil in seed, 33.83 per cent., of which 23.33 per cent. was obtained by pressing, and 10.5 per cent. was obtainable by ether extraction from the cake.

The following data was given as the result of the examination of the filtered oil: Specific gravity at 15.5°C., 0.9338; acid number, 0.6; iodine number, 196.3; saponification number, 192.2; unsaponifiable matter, 0.8 per cent.; refractive index at 25°C., 1.4855.

The analysis of the cake was: Oil (ether extraction), 10.5 per cent.; nitrogen, 3.6 per cent.; phosphoric anhydride (P_2O_5), 1.5 per cent.

Comparative tests of Chia oil showed that it dried equally as fast as linseed oil, and when heated to 500°F. for 15 minutes it showed even superior drying results to linseed oil when treated with the same amount of liquid drier. At present Chia oil seems to be largely used for manufacture into a drink in Mexico, whilst it also serves as a food in parts of Lower California. It is a clear yellow colour and possesses an odour and taste similar to that of linseed oil, but the author suggested the desirability of a thorough investigation into the whole of the species of the Chia plant to determine any variations that may exist in the oils from the different types of plant, and the commercial availability of them.

Discussion

Mr. T. M. TYSON said that, judging by the iodine value and refractive index, this oil seemed to be particularly interesting. He would like to know if the author had tried the effect of polymerising the oil, and also whether this oil was one of those extracted from a rare seed found here and there over the Continent of America, or whether there was any possibility of it becoming a commercial product. Some seven or eight years ago he had had a sample submitted to him of rubber seed oil, and, as far as his memory went, the results obtained with this were almost identical with those given by the author for Chia seed oil. The great point was to know whether a sufficient supply of seeds could be guaranteed to make it a commercial proposition.

Mr. H. A. CARWOOD, honorary secretary, said that Mr. Gardner had stated he did not know how much seed was available.

Mr. R. P. L. BRITTON said it was always interesting to hear of a new drying oil. Linseed oil had been used for this purpose for many years, but undoubtedly one of these days it would be superseded. Apparently there was no detailed information about the quantity of this particular oil available, and the important thing to investigate was whether the plant was worth cultivation. That, perhaps, was a question for the future rather than the immediate present, because probably even if there were rather large quantities of the plant available it might be somewhat difficult to collect, unless it happened to be localised. The oil certainly possessed good features, and the fact that heating at 500°F. for 15 minutes turned it into a drying oil rather indicated that it would polymerise fairly well, although, of course, there would be no polymerisation in that time. He would like to hear more with regard to the alteration of refractive index on polymerisation, because that was a very important feature, and the present refractive index recommended it for use in the paint trade.

Mr. G. C. TOWNSEND said that the success of any new seed depended on the amount of oil which could be extracted from it, i.e., it was desirable that as small a quantity as possible should remain behind in the cake. According to the paper the cake from this seed contained 10.5 per cent., and it was also mentioned as crumbling. Apparently, in order for the cake to be in a form for sale, the oil content would have to be about 15 per cent. In the best factories it was the practice to allow only 5 per cent. of oil to remain in the cake to give it a good texture, so that in this case, with 15 per cent. of the oil remaining, it did not seem that it would be a very economical process.

Chemistry and Warfare

Address by Mr. J. W. Parkes

THE inaugural meeting of the Chemical Association of the Royal College of Science for Ireland for the session 1920-21 was held in the College on Friday, November 12, the chair being taken by the President, Professor W. E. Adeney, D.Sc., F.I.C. About 300 were present.

Mr. J. W. PARKES, M.Sc., A.I.C., chemical adviser to Messrs. W. & H. M. Goulding, delivered an address on "Chemistry and Warfare." He confined himself mainly to the production of explosives and lethal gases and the intimate connection with the dye industry. For the production of explosives large quantities of sulphuric acid and nitric acid were necessary. The sulphuric acid must be in the form of oleum (fuming sulphuric acid). Only 22,000 tons of oleum were being produced yearly before the war in the U. K. Owing to the exertions of British chemists and chemical manufacturers the yearly production was raised to 450,000 tons. Two types of plants were used in its manufacture: (1) the Mannheim type; (2) the Grillo type. In the first type SO_2 is passed over; (1) heated ferric oxide and (2) platinised asbestos, and is converted into SO_3 , which is absorbed in concentrated sulphuric acid to produce 20 per cent. oleum. In the Grillo type the entire conversion is done by means of platinised asbestos alone.

Nitric acid is prepared from Chile saltpetre and strong sulphuric acid. Germany had accumulated stocks of Chile saltpetre estimated at from 100,000 to 200,000 tons, but could not have carried on the war beyond the middle of 1915 had not the synthetic nitric acid taken the place of Chile saltpetre. The lecturer dealt with the three main processes for the fixation of atmospheric nitrogen, and mentioned the Haber process in particular. This process had been developed solely in Germany and to such an extent that she has now a capacity for production far in excess of her requirements. It was a significant fact that she was reported to have sold the equivalent of 125,000 tons of ammonium nitrate for delivery within the next few months.

Explosives

Explosives might be divided into two classes, (1) Propellants and (2) high explosives, which burst the shell. German chemists developed a process by which 1,000 tons of glycerin were obtained per month by the fermentation of sugar, and substituted wood fibre for cotton waste. Each ton of cordite required $\frac{1}{2}$ ton of acetone for incorporation. A substitute for acetone was found in R.D.B. cordite, in which a different nitrocellulose was used, which was soluble in a mixture of ether and alcohol.

Benzol toluol and phenol necessary for the manufacture of picric acid or lyddite and T.N.T. were obtained from coal tar; the supplies obtained were far below requirements. Phenol was prepared synthetically from benzol by the sulphonation process, but the chemist once more saved the situation by the introduction of a new explosive, amatol, consisting of a mixture of 80 parts of ammonium nitrate and 20 parts of T.N.T. Amatol is even more powerful and is cheaper than either picric acid or T.N.T. The relative costs per ton were: Picric acid, £185; T.N.T., £100; Amatol, £60. In all 649,000 tons of amatol were examined at Woolwich.

Smoke Screens and Poison Gas

Smoke screens and artificial fogs were dealt with, and the lecturer mentioned that the evaporation of a mixture of chlorosulphonic acid and oleum was found to give the best results, particularly on sea. With regard to aviation every piece of the modern aeroplane is a triumph of chemical as well as engineering skill. Lethal gases and methods of protection were next referred to. Close connection between the dye industry and the manufacture of explosives and poison gases was pointed out in conclusion. It had been stated that 80 per cent. of her explosives and all her poison gases were made by Germany's dye factories, and that all extensions, in her case, were made at existing works, not like Gretna and Queensferry. Just as the peaceful organisation of the dye works had been made available for purposes of war, so now these war extensions could be made to serve for purposes of peace, and the recurrence of the domination of certain sections of chemistry which Germany had enjoyed would result. This was to be avoided if a permanent menace to the peace of the world was not to exist.

Chemical Matters in Parliament

Industrial Power Spirit

MR. JESSON (House of Commons, Nov. 11) asked in what way home manufacturers of alcohol would be treated unfairly by the importation of denatured spirits for motor fuel; and if the Chancellor of the Exchequer was aware that the home distillers were using every occasion and opportunity to obstruct the importation of industrial and power alcohol which was so urgently required for the motor transport services of the country?

Mr. Baldwin replied that the interests of the revenue required that home-made spirit should not be used as motor fuel unless denatured in a prescribed manner and under approved conditions. It would obviously be a handicap to the home manufacturer if imported spirits were allowed to be used duty free as motor fuel if denatured abroad under restrictions involving less cost to the producer. The answer to the second part of the question was in the negative.

Natalite

Mr. Jesson (House of Commons, asked Nov. 11) why the importation of natalite was still being obstructed and why it was classified in the tariff as a spirit mixture, which made it subject to a prohibitive import duty; and would the Chancellor of the Exchequer take steps to remove the duty, so that this proved substitute for petrol might be imported as freely as power alcohol, which, by itself, was not so suitable for internal combustion engines? In answer to the first paragraph, Mr. Baldwin said he could add nothing to the answer given on the 4th instant. The question whether natalite was a spirit mixture was one of fact; there was no provision in law for the importation duty-free of spirits denatured abroad, nor, as at present advised, did he consider it desirable that such provision should be made. The answer to the last part of the question was in the negative.

Chemists' and Druggists' Registration

Mr. Crooks asked the Minister of Health (House of Commons, Nov. 11), whether he was aware that the bye-law made by the Council of the Pharmaceutical Society, and approved by the Privy Council in February, 1920, in pursuance of Section 4 (b) of the Poisons and Pharmacy Act, 1908, deprived all persons holding the assistant's certificate of the Society of Apothecaries who had served with His Majesty's Forces during the late war from being registered as chemists and druggists and restricted registration to persons who had been continuously employed in a strictly limited number of institutions and so deprived many fully-qualified persons from registration, contrary to the express intentions of the 1908 Act; and whether he would request the Council of the Pharmaceutical Society to amend their bye-law so as to provide for the registration of chemists and druggists of all the assistants of the Society of Apothecaries who held certificates at the time of the passing of the Poisons and Pharmacy Act, 1908, provided that they had been engaged in dispensing for a reasonable period, not necessarily continuous, since 1908, so as to admit of the registration of ex-service men?

Naphthalene

Mr. T. Thomson asked the President of the Board of Trade (House of Commons, November 15) whether, notwithstanding the expressed desire of manufacturers to export naphthalene, permission is refused by the Customs authorities; if so, under what powers export is prohibited.

Sir R. Horne: The export of naphthalene, except under licence, is prohibited under the provision contained in the Customs and Inland Revenue Act, 1879, the Exportation of Arms Act, 1900, the Customs (Exportation Prohibition) Act, 1914.

Chemical Warfare

Mr. Lloyd George, replying to Lieutenant Commander Young (House of Commons, November 15), said: The whole subject of chemical warfare has been under careful consideration by the Cabinet during the past year, and it was decided on March 4 to raise the question at the Council of the League of Nations.

Dyestuffs Industry

Mr. Lloyd George, in reply to Mr. Doyle (House of Commons, November 15), said he was sorry that there was no agreement as to the lines upon which a Bill to safeguard the interests of

the British dyestuffs industry should be framed and that the Government are prepared to deal with the matter in the coming session, which will include the Government's proposals for carrying out their pledges and obligations as contained in the prospectus of the British Dyestuffs Corporation.

Mr. Doyle then asked the Prime Minister whether he had received any assurances that there was a substantial agreement, and whether he would agree to introduce a Bill this session.

Mr. Lloyd George: If there was agreement that a Bill would go through very easily—that is a matter the Government might be prepared to consider.

Mr. Lloyd George, replying to Major Barnes as to whether he accepted the whole of the allegation in the prospectus issued by the British Dyestuffs Corporation, stated that he did not remember what the whole of the prospectus contained, but they were set out quite fairly.

Review

HANDBOOK OF PATENT LAW OF ALL COUNTRIES. By W. P. Thompson. Stevens & Sons, Ltd. Eighteenth edition. Pp. 157.

This little book, written by a patent agent, gives a resumé of the patent laws of most of the countries of the world, the object being, in the words of the author in his preface, to act as a useful guide to patentees, manufacturers and investors in patents without attempting to be a complete guide to patent law. About 50 pages are devoted to an explanation of the Patents Acts and Statutory Rules of Great Britain and Ireland, and the remainder of the book to a brief epitome of the patent laws of foreign countries and colonies arranged in alphabetical order for convenience of reference.

The pages relating to British patent law, which will probably be found the most useful part of the book, are conveniently arranged under numerous sub-headings, and the progress of a patent from first to last is explained. A point of interest to chemists is that it is not now possible to patent a chemical substance itself, or a food or medicine except when produced by a particular novel method or an obvious chemical equivalent. Patents for preparing food or medicine are further subject to the grant of compulsory licences on favourable terms to the licensee.

The descriptions of the patent laws of most of the foreign countries are much less full, but the particulars given will be sufficient for the requirements of most readers. It may, perhaps, be doubted whether the usefulness of the book to the average reader would not be increased by omitting the sections relating to some of the smaller foreign countries for which there can be little demand, and devoting the space to a fuller description of the patent laws of important countries such as Germany, France and the United States.

A few errors and ambiguities have been noticed in minor details. For instance, it is stated on page 14 that when an invention is completely forestalled by a single prior patent, the Comptroller (of Patents) can refuse the patent, but very rarely does so. In point of fact, experience shows that such patents are almost invariably refused, but the complete forestalling of an invention is necessarily very rare. The statement on the same page that a patent may be sealed with a date later than that of application in consequence of delay in amending needs considerable qualification.

The advice given to inventors to apply for patents in Germany and the United States in order to get the report of their examiners as to novelty before deciding on the form of the claims for a British patent is of doubtful value, since the kind of claims required and their interpretation are so utterly different, particularly in the United States, as almost to preclude comparison; this, indeed, is indicated in the sections on those countries. An applicant for a British patent probably cannot do better than draw his claims as widely as possible and leave the British patent office to demand the necessary limitations.

The general arrangement of the book is excellent, and the details of a somewhat intricate subject are carefully and lucidly explained without too much legal phraseology; it is well adapted to serve its purpose of answering the questions which arise in the minds of inventors and others.

£100,000 for Scientific Research

Application for Injunction against Brunner, Mond & Co. Refused

IN the Chancery Division of the High Court on Wednesday, Mr. Justice Eve gave judgment in the case of *Evans v. Brunner, Mond & Co.* The motion was for an injunction to restrain the defendant company from paying or distributing £100,000 or any part of it by donation or otherwise under a resolution passed at an extraordinary general meeting on August 5. The resolution was "that the directors be and they are hereby authorised to distribute such to universities or other scientific institutions in the United Kingdom as they may select for the furtherance of scientific education and research the sum of £100,000 out of the investment surplus reserve account."

Mr. CLAYTON, for the applicant, submitted that the resolution was *ultra vires*, and the question raised was whether what was proposed was within the objects of the company. The memorandum of association said that the main object was the purchase of the business of Brunner, Mond & Co., chemical manufacturers, and the company also took power to do all such business as might be incidental and conducive to the "above objects or any of them." These objects were not objects of general science. If it were said that the expenditure was to provide a reservoir from which the company could draw highly-trained men the same would apply to education generally.

Judgment

In giving judgment, Mr. Justice Eve (after stating the facts), said that the first question was one of construction of the resolution. Was the authority thereby conferred strictly limited and hedged round so as to imply an obligation on those to whom it was given to exercise the discretion vested in them in the interests of the community of which they were merely agents? The question was really whether such an application of the company's funds was within or without the power of the company. The defendants said that it was within, and that there was express power to do it. For the purpose of this decision it was not necessary to distinguish between powers and objects. They had here Clause 3 (s) of the memorandum, which allowed the doing of all things which were "incidental or conducive to the attainment of the above objects or any of them." That was, it must be incidental or conducive to the paramount purpose for which the company was formed. The business here was that of chemical manufacturers. That was its main purpose. From the evidence that had been filed it appeared that from those qualified to speak the expenditure would be for the benefit of the community and also of the company. It was said on behalf of the plaintiff that that was too vague, but he was unable to accede to that argument. But he confessed that he felt some difficulty as to two points—the furtherance of scientific education and research generally. He was not at liberty, however, to disregard the evidence of the directors and others who were specialists in the business. They said that it would tend to cause the universities and institutions to train students and others, of whose services they could take advantage in the work of the company. That seemed to him to do away with the criticism that it was too general and not confined to a special branch of science.

Then it was said that it was of no advantage to the company. But these universities and institutions would, no doubt, be resorted to in the future by persons of capacity from all parts of the world, who might in some cases act as the rivals of the company. But it was a question of degree whether the advantage outweighed the disadvantage, and on the evidence his Lordship thought that it did. Then it was said to be too remote. But here again the evidence, particularly that of the chairman, pointed to this—that the company was in great difficulties to find the right class of men necessary for the proper conduct of its business as chemical manufacturers. He further pointed out how the provision of this fund would go to bringing into existence an efficient body of men from which it could recruit itself, and thus continue its work.

On the evidence the defendant company had established that the resolution was not too general, but was likely to lead to the direct advantage of the company.

In these circumstances his Lordship thought that he ought not to interfere by injunction, and he would make therefore no order on the motion.

Chemical Plant Case

Action for Alleged Breach of Contract

MR. POLLOCK, High Courts Official Referee, on Nov. 13th gave judgment in an action in which Messrs. Keeling & Walker, Ltd., chemical manufacturers, of Fenton, Stoke-on-Trent, claimed from the Sturtevant Engineering Company, of 147, Queen Victoria Street, London, damages for alleged breach of contract, in relation to the supply of plant for the manufacture of zinc oxide, and for the return of money paid in respect of the plant.

From Counsel's opening it appeared that the plaintiffs entered into a contract with the defendants for the supply of a zinc oxide recovery plant and a carling plant for a total sum of £2,725, the plaintiffs undertaking to provide rough labour and to assist in the erection. At the end of May, 1918, Mr. Ardell, of the defendant firm, went to the plaintiffs' works and had an interview with Mr. Keeling. Mr. Ardell was emphatic as to the value of a process which would produce 25 per cent. better results than the best type of pressure filters. As a result of the interview Mr. Ardell made a report to the defendants and subsequently, in accordance with the terms of a contract, the plant was erected. On delivery the plaintiffs paid £1,563 and £624 on account of the purchase price. It was, however, found that the plant was unfit for the purpose and, that it was less productive than the best type of pressure filter. They, therefore, required the defendants to remove it, and they now claimed £8,525 damages.

The defence was a denial that the plant was ineffective, and that alterations were made by the plaintiffs without consulting defendants.

Defendants also pleaded that they were ready and willing to make good any defects as specified in the contract, but plaintiffs did not give them an opportunity of so doing.

The Official Referee, in the course of his judgment, said that the point to be decided was whether the plant was permanent and therefore real property, or whether it was merely goods supplied. That it was removable was shown by the fact that a large portion of it had been removed and it was, therefore, merely goods. That being so there was an end of the case for the plaintiffs, and being goods it came within the provisions of the Sale of Goods Act, and the conditions of the contract. There would, therefore, be judgment for the defendants with costs.

Chemical Merchants' Failure

First Meeting of Creditors

UNDER a receiving order made against Felice Adolpho Bonaventura, Hugh Edward Aveline and Edward Harrison, trading as Felice Bonaventura & Co., 24, Great Tower Street, E.C., chemical merchants and importers, on their own petition, the first meeting of creditors was held at the London Bankruptcy Court on November 12. A statement of their affairs showed gross liabilities amounting to £17,480 2s. 6d., of which £14,743 was expected to rank for dividend, against net assets £148 10s. 9d. In July, 1906, the debtor Bonaventura started business on his own, he took into partnership in 1912 Mr. Aveline who put £1,050 into the business. In February, 1913, Mr. Harrison was employed as chemist and he supervised the chemical branch. Mr. Aveline brought in a further £1,000 for this extension, and the business was quite successful until the outbreak of war, when it came more or less to a standstill. In 1916 they took premises at Stratford for the manufacture of lanoline, and about that time they took Mr. Harrison into partnership. The Stratford branch cost about £3,000 for machinery and fittings, and they carried it on until 1919 at a loss of about £2,000. It was then closed, and the machinery sold for £620. The other branch of their business was successful until August, 1918, but since then they had been losing heavily. Recently they called their creditors together and were advised to file their petition.

The creditors appointed Mr. A. H. Partridge, chartered accountant, of 3, Warwick Court, E.C., as trustee of the estate.

Mr. W. Smith, of Bolton (Manchester College of Technology), won the first prize in the 1919-20 competition of the Crompton Memorial Prize Scheme of the Textile Institute for advanced students in design and structure of woven fabrics. Mr. C. Nutter won the second prize and Mr. R. Bailey the third; both of the Nelson Municipal Technical School.

Chemical Imports for Re-Exportation

Traders' Proposals to Board of Trade

At the recent interview between the Chemical & Dyestuffs Traders' Association and Mr. Percy Ashley of the Board of Trade respecting the Government Bill for the prohibition of imports subject to a licensing system, attention was drawn to the position of goods imported for re-exportation, and it was suggested that it might be possible, though admittedly difficult, to formulate a scheme by which chemicals and dyestuffs on the prohibited list might still, under adequate safeguards against abuse, be permitted to be imported expressly for the purpose of re-exportation. As the result of this suggestion, a sub-committee of the Association has prepared the following memorandum, which has been submitted to the Board of Trade:—

(1) That the import for re-export of goods in Bond should be generally permitted subject to the goods remaining in control of the Customs Authorities until re-exportation is effected.

(2) That in all cases where the goods so imported are being re-exported in their original packages (any changes being confined to external marks and numbers), the goods should be held in Bond until shipment is made for re-exportation.

(3) That in all cases where goods have to be re-packed before re-exportation arrangements should be made whereby the re-packing should be effected under proper supervision whilst the goods are under bond at the Port of arrival. That at Ports most used for the importation and re-exportation of such goods, say, London, Liverpool, Glasgow, Hull and Manchester, and/or such other Ports as might from time to time be found advisable, a definite room or part of the re-packers' warehouse should be set aside and provided with suitable locks and be placed under the entire control of an individual satisfactory to H.M. Customs to whom he would be fully responsible. That a proper charge should be made for the accommodation and for the services rendered.

We are of opinion that any such system to be effectively worked would involve the provision that the re-packing of goods imported expressly for re-exportation should be carried out by persons or firms licensed by the Board of Trade to do such work and that then the Board of Trade would only grant licences for the importation expressly for re-exportation to persons or firms whose commercial integrity is unquestionable.

If such principles are established and applied and the Board of Trade exercise full discretionary power as to whom licences can properly be granted, the danger in respect of adulteration or sophistication of re-exports would be overcome in a satisfactory manner, and the scheme would be as acceptable to the trade as any system of restrictions is likely to be.

Petrol Dealer's Insolvency

JOHN CUTHERTSON BEGG, of Ingleby Lane, Saxilby, Lincs., petrol dealer, carrying on business at Horse and Groom Yard, Lincoln, in his statement of affairs shows liabilities expected to rank for dividend amounting to £394 16s. 7d., and assets estimated to produce £14 3s. 10d., showing a deficiency of £380 12s. 9d. He attributed his failure to the high cost of living, want of capital and pressure by a firm of creditors, and the costs of their action. Debtor said he qualified as a chemist in 1897, and subsequently held several situations as manager. Replying to Mr. Langley, who appeared for the petitioning creditor, debtor admitted that he was insolvent when he started on his own account to deal in petrol. The Official Receiver said he wanted to get at any assets the debtor might have, and the examination was adjourned.

Universities Congress, 1921

FIFTY-EIGHT universities will take part in next year's congress at Oxford and London. Congresses are summoned every five years by the Universities' Bureau, but the 1917 function was not held because of the war. A congress would have been held this year had it not been for transport difficulties. Next year's congress is being promoted by Dr. Alexander Hill. Members of the congress will be the guests of Oxford University from July 5 to July 8, and assemble in London on the preceding day.

National Union of Scientific Workers

PROFESSOR SODDY, at the annual meeting of the National Union of Scientific Workers, on Saturday last, said it had been laid down in White Paper 8005 (1915) that discoveries aided by public money should be made available, under proper conditions, for the public advantage. At present the public had no share in the results of what they paid for, and the researcher lost his property in his own discoveries. There was no greater example of unfair competition than in the chemical industries. The small business man was not protected. He moved a resolution disapproving of the policy of the Department of Scientific and Industrial Research, which handed over to the private use of profit-seeking monopolies valuable knowledge obtained at the expense of the whole community, and placed the research association in a position to exploit the scientific workers of the country for their own benefit. The resolution was unanimously adopted.

Dr. J. W. Evans, the retiring president, in his address said he regretted the fact that the scientific and technical faculties of our universities played only a subordinate part in the scheme the Department had adopted for the promotion of research. He put forward a resolution in favour of the closest possible association of universities in research work. In seconding, Professor Soddy mentioned the request of the War Office that the universities should undertake research into the development, to its utmost extent, of chemical-warfare research.

Ammonia Washing

"AMMONIA Washing" was the subject of a short paper before the Midland Junior Gas Engineers at the Birmingham Council House on Thursday last by Mr. W. J. Pickering, chairman of the Coal Test Works of the Birmingham Gas Department. The section of works plant designed to remove to NH_3 from crude gas is most important. The yield of NH_3 from coal is commonly stated as 80 many gallons of "10 ounce" liquor per ton, and even a good yield, such as 40 gallons per ton, implies only about one-fifth of the total nitrogen in the coal. This emphasises the need for careful extraction of NH_3 in the gas stream, and in this connection the policy which still obtains at some works of allowing NH_3 to the extent of about 20 grains per 100 cubic foot of gas to pass forward to the oxide purifiers in order to assist the working of the latter is bad practice. It may achieve, and undoubtedly does, temporary increase in activity of the material, by neutralising acidity, but the life of the oxide is reduced in the long run by formation of insoluble cyanide compositions of NH_3 . Apart from this there is a distinct loss of revenue by reason of the NH_3 thus lost. A better method of reducing oxide acidity is to water the material when spread out for revivification with a weak solution of commercial soda ash (Na_2CO_3).

German Dye Combine

COMBINED under the name of Interessengemeinschaft German dyestuff manufacturers are consolidating their interest in order to prevent disunion. The German dyestuff makers are reported to be making large profits. Although the Interessengemeinschaft is combined until 1966, that is regarded as too short a period, and next month it is hoped to alter the date to the year 2000, or, more accurately, December 31, 1999. There is also a suggestion in favour of the condition of termination being a four-fifths majority, which would make the concern to all intents permanent. The synthetic ammonia works controlled by the Badische Anilin und Soda Fabrik is to be taken over by a separate joint stock company. Five hundred million marks will be the capital of the new concern (£25,000,000 at pre-war rate of exchange). This is to be subscribed pro rata by the eight firms in the combine. Haber process foreign patents will remain the property of the firms which comprised the old Cartel, the Badische Company, the Bayer Company and the Berlin Aniline Company.

Books Received

ORGANIC CHEMISTRY. By Julius B. Cohen. Third Edition, in three vols. Vol. I., Reactions, pp. 366; Vol. II., Structure, pp. 435; Vol. III., Synthesis, pp. 378. (London, Edward Arnold. 18s. net each volume.)

From Week to Week

Mr. H. Wynne Williams, chemist at Barmouth for 51 years, died on November 5.

Manchester is endeavouring to double its supply of radium, which is worth £30,000.

It is announced that Sir J. J. Dobbie has retired from the post of Government chemist.

Mr. W. E. Alkins, M.Sc., has been appointed lecturer in metallurgy at the Manchester University.

Several thousand pounds damage was caused by fire at the Stamshaw Chemical Works, Portsmouth, last week.

The death took place last week of Mr. Alfred Watkin James, well known in Sketty, Cambria, as a chemist. Mr. Watkin was 80 years of age.

The death occurred at Leeds on November 8 of Mr. Frederick A. White, son of Dr. J. F. White. Mr. White was a well-known manufacturing chemist.

Mr. Julian L. Baker becomes editor of the *Analyst* as from next January. His successor as editor of the *Journal of the Institute of Brewing* will be Mr. C. A. Mitchell.

So far this year over one hundred million gallons of petrol have been imported into this country above the quantity imported during the first 10 months of 1919.

No prize for chemistry will be given this year by the Swedish Academy of Science. The Nobel prize for physics was given to M. Charles Edward Guillaume, of Breteuil, on November 12.

Longton mining chemistry class (second stage) had been transferred to the School of Science and Technology, said the clerk (Mr. R. P. G. Williamson) at a meeting of governors at Stoke on November 10.

Soap is being made from clay by the Harro-Sul-Wa Co., Harrogate. It is called "Moorland" soap, and is claimed to be not only an excellent toilet soap, but to possess great possibilities in industry, particularly for wool washing.

The Gold Medal of the Institution of Mining and Metallurgy has been awarded to Sir Thomas Kirke Rose, D.Sc., in recognition of his eminent services in the advancement of metallurgical science.

Instantaneous death occurred to a whitewasher named Matthew Dyson at the chemical works, Holme Lane, Bradford, on Tuesday. Dyson was standing on a ladder when his clothing was caught in some revolving shafting, around which he was whirled.

A fire which broke out at the Isleworth Rubber Factory, Isleworth, London, on Sunday, November 4, was not extinguished until 11 o'clock on Monday morning. The whole of the building was practically destroyed, and a rough estimate puts the damage at £20,000.

J. H. Sankey & Son, Ltd., manufacturers of fire bricks, tiles, clay and cement, of 74, Cheapside, E.C. 2, are sending to their customers a list of temperatures which they have compiled. They offer to supply additional copies to readers of THE CHEMICAL AGE on application.

The Challenge Oil Company's Howard Works, Stoke Newington, were destroyed by fire on Saturday last. The fire broke out in the early hours of the morning, and in a very short time had reduced the premises to ruins. Only the prompt efforts of the fire brigade in strong force prevented the surrounding buildings from being destroyed.

America is paying particular attention to gas measures in military training. It is probable that poison gas will form part of the equipment of every American soldier in the future. Two battalions of gas troops are reported to have carried out experiments. The gas is in a solidified form, and is carried in small tubes.

Mr. F. R. O'Shaughnessy, consulting chemist of the Birmingham Tame and Rea District Drainage Board, and hon. sec. of the Birmingham and Midland section of the Society of Chemical Industry, was on Wednesday appointed, at a fee of £500 per annum, to carry on experiments on sewage on lines which will be of service to the Board and useful to the Ministry of Health and the scientific world generally. The experimental

plant for the treatment of sewage by the activated sludge process at the Board's works is now completed.

The Council of Sheffield University on Friday, November 12, in connection with its department of Glass Technology, decided to purchase the glass works of P. T. Turner & Co. The purchase price is being subscribed by glass manufacturers in the district. At the same meeting, Miss E. Bradbury, B.Sc., was appointed demonstrator in metallurgy.

N. Powell & Co., of Bombay, surgical instrument makers and chemists to the Governor-General and Governor of Bombay, have issued their 31st annual report. They have several laboratories, such as chemical research and analytical, pharmaceutical, bacterio-pathological institutes, experimental workshops, and have the control of the Zander Orthopedic and Medico-Electric Institute.

Regent Street Polytechnic war memorial was unveiled on Sunday by the Mayor of Marylebone. Among the 300 names of members who were killed was Colonel Ian Hogg, son of the late president. Col. Hogg was killed while in command of the 4th Hussars at the retreat from Mons. At the ceremony, Mr. J. E. K. Studd, the president, was in the chair, and the large hall was filled to overflowing.

The Rangoon Government has decided to establish a university in that province. A council, comprising representatives of the Burma Chamber of Commerce, the Rangoon Trades Association, and other bodies, will be responsible for the administration. Matters connected with teaching will be in charge of a senate composed almost exclusively of professors and lecturers.

An appeal is being made for £500,000 for the Newcastle colleges. Of this sum Durham University is asking for a quarter. The last balance sheet showed a deficit. Armstrong College is even in a worse condition. The income of the College amounts to £65,000 a year, and the present rate of expenditure is £85,000 and it is impossible to retrench. A large and influential committee, with the Duke of Northumberland as chairman, has been elected to organize the appeal.

The Royal Society Awards include the following: The Copley Medal, Mr. H. T. Brown, F.R.S., for his work on the chemistry of carbohydrates, the assimilation of atmospheric carbon dioxide by leaves, and on gaseous diffusion through small apertures; the Rumford Medal, Lord Rayleigh, F.R.S., for his work in physical chemistry, and more especially on the composition and constitution of alloys; the Hughes Medal, Professor O. W. Richardson, F.R.S., for his work in experimental physics, and especially thermionics.

The next meeting of the Society of Public Analysts will be held at the Chemical Society's Rooms, Burlington House, at 8 p.m., on Wednesday, December 1, when the following papers will be read: "Estimation of Theobromine," by Raymond V. Wadsworth; "A New Process for the Estimation of Small Quantities of Chromium in Steels," by B. S. Evans, M.B.E., M.C., B.Sc., F.I.C.; "Some Notes on the reactions between Fulminate of Mercury and Sodium Hyposulphite," by P. V. Dupré, M.B.E., A. C.G.I., F.I.C., and F. H. Dupré.

On Monday night a fire broke out at Messrs. Brotherton & Co.'s ammonia distillery in Holmes Street, Dewsbury Road, Leeds, damage being done to the extent of £2,000 to £3,000. A one-story building, consisting of offices and a laboratory, was affected. Fanned by a strong wind, flames spread with alarming rapidity, but the prompt and effective work of the City Fire Brigade confined the outbreak to this portion of the works, and the main block was not involved. A fireman was overcome by the ammonia fumes, but recovered after first aid treatment was rendered. The origin of the fire is not known.

Professor C. M. Thompson presided at a meeting of the Bristol and South Wales Section of the Society of Chemical Industry, held at the University College, Cardiff. A paper was read by Mr. A. Brennan, B.Sc., on the geology of the Mexican oilfields. Mr. Brennan described his experiences when oil prospecting in that country. He stated that the scientific exploration of the strata was much hampered by the extensive floods, but it was generally possible to dig pits and so find the anticlines where the oil, if any, was always discovered. Theories of the formation and origin of the oilfields were put forward, and the chemical constituents of the different oils described. The paper provoked an interesting discussion.

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- BRASS.** Reclamation of metal from brass-foundry refuse. F. L. Wolf and G. E. Alderson. *Metal Ind. (N. York)*, October, 1920, pp. 452-455.
- ELECTROPLATING.** Analysis of plating solutions. J. Haas. *Metal Ind. (N. York)*, September, 1920, pp. 412-414; October, 1920, pp. 464-466.
Lead plating from sodium hydroxide lead baths by the use of addition agents. F. C. Mathers. *Metal Ind. (N. York)*, October, 1920, pp. 467-468.
Faraday's law at the cathode. J. W. Richards. *Metal Ind. (N. York)*, October, 1920, p. 469.
- REFRACTORIES.** Refractory substances. A. Bigot. *Sci. Amer. Monthly*, October, 1920, pp. 133-135. A translation from *La Revue de l'Ingenieur*.

German

- ZINC.** On the value of zinc in its ores and economical principles in its extraction. J. Paul. *Metall. u. Erz*, October 22, 1920, pp. 439-449.
- OILS AND FATS.** The importance of refractive power in the valuation of oils and fats. H. Utz. *Z. angew. Chem.*, October 26, 1920, p. 264, and November 2, 1920, pp. 268-269.
- DISTILLATION OF ACIDS.** On the behaviour of mixtures of sulphuric and nitric acids on distillation. J. Baumann. *Chem. Zeit.*, October 28, 1920, p. 805.
- NITROGEN.** Progress during the world-war of large scale manufacture of inorganic nitrogen compounds. B. Waeser. *Chem. Zeit.* A long series of articles still proceeding in current numbers of that journal.
- HYDROCARBONS.** A new absorbent for heavy hydrocarbons. A. Piechota. *Chem. Zeit.*, October 26, 1920, pp. 797-798.
- FIBRES.** On the decomposition of bast fibres. P. Kraus. *Z. angew. Chem.*, November 9, 1920, pp. 277-278.
- AMMONIUM SULPHATE.** On the melting and boiling of ammonium sulphate. — Jänecke. *Z. angew. Chem.*, November 9, 1920, pp. 278-280.

Patent Literature

Abstracts of Complete Specifications

- 152,384. PHENOL-FORMALDEHYDE, CONDENSATION PRODUCTS AND PRODUCTION THEREOF. A. W. Weller, 240, Oxford Street, London, W.1, and W. T. Robinson-Bindley, 158, Worple Road, Wimbledon, S.W.19. Application date, June 10, 1919.

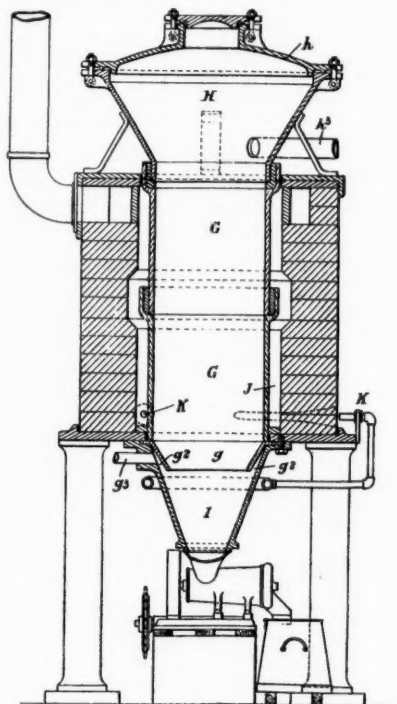
In the manufacture of condensation products, the strength of the product is improved, and the usual odour is removed by adding cellulose acetate or nitrate in the proportion of 0.7—0.8 per cent. of the phenol employed. The cellulose derivative is preferably dissolved in the phenol by the aid of heat, and the mixture then condensed with the aldehyde.

- 152,387. SOLUBLE NITROGEN COMPOUNDS FROM SOLUTIONS, RECOVERY OF. E. H. Richards, Somersby, Spenser Road, Harpenden, and H. B. Hutchinson, Wyver, Spenser Road, Harpenden. Application date, June 14, 1919.

Dilute solutions of soluble nitrogen compounds such as ammonium salts, sewage, and the like are maintained in contact with activated carbonaceous material such as activated straw, under aerobic conditions. The carbonaceous material converts the soluble nitrogen compounds into insoluble compounds, and the process is continued until less than 10 per cent. of the original soluble compounds remain. The carbonaceous material may be activated by maintaining it in contact, under aerobic conditions, with a dilute solution of soluble nitrogen compounds, such as ammonium salts, sewage or the like, for about 90 hours. The products are available as fertilizers.

- 152,401. ANHYDROUS MAGNESIUM CHLORIDE, OR ANHYDROUS DOUBLE CHLORIDES OF MAGNESIUM. E. A. Ashcroft, 65, London Wall, London. Application date, July 9, 1919.

Hydrated magnesium chloride is treated with a large quantity of hot air until about two-thirds of the total water has been



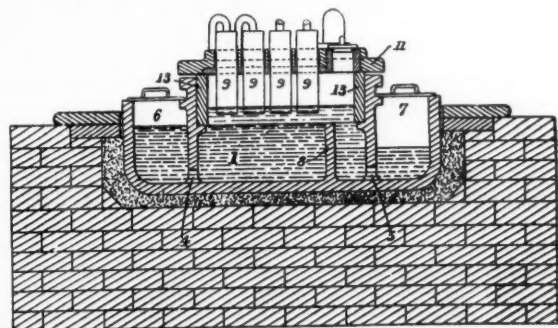
152,401

removed, the temperature being raised to about 150°C. A slow current of hydrochloric acid gas is then substituted for the air, and the temperature is gradually raised to a maximum of 650°C. Under these conditions a product containing 98 per cent. of anhydrous magnesium chloride is obtained, and the

hydrochloric acid gas is absorbed in the water which is driven off, yielding a strong solution. The first stage of the process is carried out in a vertical retort surrounded by heat insulating material, the air being introduced at the bottom. The second stage is carried out in a retort G made in two sections which may be formed of silica glass, heating being effected by a furnace J into which gas and air are injected tangentially at K. The retort is surmounted by a charging hopper H closed by a cover h and provided with a pipe h³ for the hydrochloric acid gas and water vapour. The outlet, I, for solid material is provided with a depending part, g, leaving an annular space, g^a, into which hydrochloric acid gas is passed by the pipe g³. Dry hydrochloric acid gas may be obtained from its solution by adding strong sulphuric acid, so that the process is cyclic.

- 152,402. ANHYDROUS MAGNESIUM CHLORIDE, PROCESS FOR THE ELECTROLYTIC DECOMPOSITION OF—AND THE PRODUCTION OF MAGNESIUM AND CHLORIDE. E. A. Ashcroft, 65, London Wall, London. Application date, July 9, 1919.

Two cast-steel electrolytic cells, similar to that shown in the illustration are used. Each has a main part, 1, connected by passages, 4, 5, with opposite pockets, 6, 7, and a weir, 8, projects upwards into the main part, 1. The portion above the weir, 8, is lined with fireclay, 13, and the anodes, 9, project downwards through the insulated covers, 11. The primary cell, 1, is provided with graphite anodes and a cathode of lead-



152,402

magnesium alloy, while in the second cell a similar alloy constitutes the anode and the cathodes (corresponding to 9) are of iron or steel. The cells are arranged in series, the two metal containers being connected together. Anhydrous magnesium chloride is electrolysed, and the magnesium produced is dissolved in the alloy which eventually overflows the weir, 8, into the pocket, 7, from which it is periodically withdrawn and transferred to the second cell. In this cell the electrolyte is not consumed, and the magnesium is deposited on the depending cathode, and is periodically removed. The magnesium obtained is of a high degree of purity.

- 152,403. MAGNESIUM, OR ALLOYS OF MAGNESIUM, PRODUCTION OF—AND A BYE PRODUCT THEREFROM. E. A. Ashcroft, 65, London Wall, London. Application date, July 9, 1919.

Hydrated magnesium chloride is dehydrated as described in 152,401, and electrolysed as described in 152,402, yielding magnesium and chlorine gas. The chlorine is passed through an emulsion of magnesium oxide to produce hydrated magnesium chloride and magnesium chlorate. The latter is recovered by crystallisation, and the chloride is then crystallised, dried, and dehydrated for use again in the process.

- 152,420. DESTRUCTIVE DISTILLATION OF WOOD IN SUCTION GAS PLANT, PROCESS FOR THE EXTRACTION AND RECOVERY OF BYE PRODUCTS FORMED BY. J. C. Roberts, 80, De Grey Street, Hull. July 14, 1919.

The wash water from a suction gas plant is passed through

the scrubbers many times until rich in acetic acid, methyl alcohol, and acetone. The volatile products are removed under partial vacuum and the acid neutralised with chalk or barium carbonate after each passage through the scrubbers.

- 152,447. SULPHUR FROM GASES OBTAINED IN THE ROASTING AND SMELTING OF SULPHUR BEARING ORES, PROCESS FOR THE SEPARATION OF. C. G. Collins, Woodmere, Nassau County, N.Y., U.S.A. Application date, July 22, 1919.

The sulphurous gas from the furnace which is at 700° - 925° C., is passed into a cooling chamber which is maintained slightly above the condensation point of sulphur by regulating the speed of the gas through the chamber. The gas is then passed into a deposition chamber provided with baffles and containing asbestos filter elements. The sulphur is thus condensed as a dry product, and rise of temperature in the deposition chamber and consequent loss of sulphur are avoided.

- 152,470. BENZOLE OR THE LIKE, PURIFICATION OF. South Metropolitan Gas Co., E. V. Evans and H. Hollings, 709, Old Kent Road, London, S.E.15. Application date, Aug. 16, 1919.

Benzole is heated to 30° - 90° C. and then treated with sulphuric acid of 60-85 per cent. strength. Alternatively benzole may be boiled with sulphuric acid of 73-82 per cent. strength, or the vapour may be passed through acid of 70 per cent. strength at 84° C. Under these conditions the thiophenes are converted into sulphonic acids and removed without loss of benzene or its homologues.

- 152,495. ALCOHOL OR ETHER, PROCESS AND APPARATUS FOR THE MANUFACTURE OF. A. A. L. J. Damiens, 167, Route d'Orleans Arcueil-Cachan (Seine), M. C. J. E. de Loisy, 40, Avenue de la Bourdonnais, Paris, and O. J. G. Piette, 101, Avenue de la Toison d'Or, Brussels. Application date, September 16, 1919.

The process is for the manufacture of ethyl alcohol and ether from the ethylene contained in illuminating gas or industrial gases. The gas is passed through towers containing sulphuric acid of 66° Bé. at ordinary temperature, or preferably at 100° C. to 120° C., in the presence of catalysts such as sulphates of iron, cobalt, nickel, cerium, manganese, chromium, molybdenum, uranium, tungsten, copper, lead, mercury, gold, vanadium, titanium, tin, and phosphoric, phosphorous, sulphuric or arsenious anhydrides. The gas is previously dehydrated and freed from higher hydrocarbons of the acetylene and ethylene series. The acid may alternatively be sprayed into the gas. The acid is then diluted and distilled to obtain alcohol and ether, and the acid recovered for use again or for fixing the ammonia if coke oven gas is being treated.

- 152,526. ARSENIUS ACID, PROCESS OF REFINING. M. Uchino, 1242, Ashio Kamitoga Tochigi, Japan. Application date, October 27, 1919.

Arsenious acid is purified by adding copper oxide with or without iron oxide and refining in a muffle furnace. The arsenious acid is obtained without coloration, and free from sulphides, selenium, metallic arsenic, &c.

- 152,554. HYDROGEN, PROCESS FOR PRODUCING. C. Toniolo and Officine Elettrochimiche Dottor Rossi, Legnano, Italy. International Convention date (Italy), October 29, 1919.

Iron oxide or other oxide is reduced by gases from electric smelting furnaces, or blast smelting furnaces to obtain the metal or lower oxide, which is then treated with water vapour to produce hydrogen and regenerate the oxide.

Note.—The following specifications, which are now accepted, were abstracted in THE CHEMICAL AGE when they became open to inspection under the International Convention:—130,978 (J. Joel) relating to apparatus for dehydrating, reducing, calcining, or roasting minerals, &c. (See Vol. I, p. 504); 136,169 (G. Grisard) relating to neutralising mineral oils. (See Vol. II, p. 184); 138,330 (Vereinigte Chemische Werke Akt.-Ges.) relating to manufacture of glycerol from sugar. (See Vol. II, p. 386).

International Specifications Not Yet Accepted

- 149,911. PURIFYING COAL GAS OR THE LIKE. Farbwerke vorm Meister, Lucius & Bruning, Hoechst-on-Main, Germany. International Convention date, July 29, 1919.

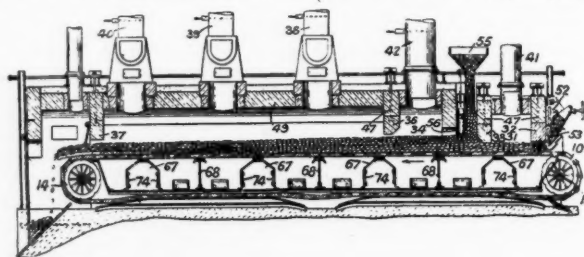
Coal gas is first treated by the usual purifying process, including the complete removal of sulphuretted hydrogen. The gas is then passed over finely divided porous carbon or charcoal to remove residual sulphur compounds, the charcoal being obtained by the carbonisation of hard woods. The charcoal is contained in cylinders which may be heated to expel the condensate, and the charcoal is revived on cooling.

- 149,915. CHEMICAL REACTIONS, APPARATUS FOR CARRYING OUT. M. Brutzkus, 47, Glattbachstrasse, Zurich, Switzerland. International Convention date, August 4, 1919.

The apparatus consists of a compressor which takes in predetermined quantities of the materials, compresses them with rise of temperature, or expands them with fall of temperature, allows the reaction to take place, discharges the products and takes in a fresh charge. The apparatus may operate on the principle of a two-stroke cycle or four-stroke cycle engine. The materials may be subjected to the action of catalysts or to electric arc or spark discharges or the like during the reaction stage which may be arranged to occur during the compression stroke or at any other suitable point in the cycle. Additional reciprocations of the piston may be made to mix the materials, and provision is made for heating the cylinder and for treating the material with catalysts, &c. The apparatus may be used for cracking heavy hydrocarbons by injecting them into compressed water vapour, air, carbon dioxide, or hydrogen; for vaporising fatty acids and esters; for hydrogenating unsaturated fatty acids and hydrocarbons; for the production of soda by injecting neutral or ammoniacal sodium chloride solution into compressed carbon dioxide at a high temperature; for the production of caustic soda by injecting sodium chloride and a combustible material into compressed air and steam; for making chlorine by the Deacon process or sulphur trioxide by the contact process; for making formates by injecting caustic soda into compressed carbon monoxide or water gas; for the synthesis of ammonia; for making ozone and hydrogen peroxide by the action of compressed air and water vapour in succession on barium peroxide; for making formaldehyde from methyl alcohol with a silver catalyst; for producing hydrocarbons from acetylene, hydrogen and water gas; for oxidising aldehyde; for producing alcohol from aldehyde and hydrogen; and for the production of oxides of nitrogen.

- 149,927. ZINC OXIDE; BASIC LEAD SULPHATE FURNACES. New Jersey Zinc Co., 160, Front Street, New York. (Assignees of J. A. Singmaster, Bronxville, New York; and F. G. Breyer and E. H. Bunce, Palmerton, Pa.)

International Convention date, July 22, 1919.
Zinc or other oxides or basic lead sulphate are produced by the Wetherill process on a travelling hearth, about 75-85 per cent. of the total fuel being in the fuel bed. The fuel and the ore may be briquetted as described in 147,530 (See



149,927

THE CHEMICAL AGE, Vol. III., p. 429). Fuel is supplied from a hopper 52 to an endless travelling grate 10 passing over wheels 14, 15, and is ignited between the arches 32, 33. The ore or mixed ore and fuel are supplied from a hopper 55, and air is supplied to the chambers 67 arranged between partitions 68. Dampers 74 operated from outside control

the passage of air to the grate. Gases are withdrawn by flues 41, 42, and fumes by flues 38, 39, 40, and the products recovered. Details of the furnace are given.

- 149,925. ZINC OXIDE AND BASIC LEAD SULPHATE. New Jersey Zinc Co., 160, Front Street, New York. (Assignees of F. G. Breyer and A. E. Hall, Palmerton, Pa., and J. A. Singmaster, Bronxville, New York.) International Convention date, August 1, 1919.

Air is blown through a mixture of fuel and ore in the form of briquettes of double pyramidal form with a binder of sulphite cellulose liquor to produce volatile metal oxides and compounds, such as zinc oxide and basic lead sulphate. The briquettes are moulded at a pressure of 2,000 lb. per square inch, and then dried at 200°C. The air blast is used at a lower pressure than in the known process.

- 149,974. FATTY ACIDS. F. Fischer, 2, Kaiser Wilhelm Platz, Mulheim-on-Ruhr, Germany. International Convention date, June 10, 1919.

Coal, lignite, peat, wood, &c., may be oxidised by compressed air or oxygen in the presence of aqueous or other incombustible liquid to produce fatty acids, oxy-acids, tar acids, &c. As an example, powdered coal mixed with soda solution may be heated to 230°C., and treated with air at 30 atmospheres pressure. Soap or other emulsifying agents, and iron or manganese salts as catalysts may also be added.

- 149,979. SYNTHETIC RESINS. F. Fischer, 2, Kaiser Wilhelm Platz, Mulheim-on-Ruhr, Germany. International Convention date, May 24, 1919.

Phenols in aqueous solution, phenolic tars or tar oils are mixed with catalysts such as iron, and with hydrocarbon diluents, and treated with oxygen-containing gases under pressure to produce resinous or asphalt-like substances. As an example, a mixture of phenol or cresol and soda lye, or *o*-cresol and dilute sulphuric acid may be heated to 200°C. and treated with air at 40 atmospheres pressure.

- 149,982. SYNTHETIC RESINS. Barrett Co., 17, Battery Place, New York. (Assignees of S. P. Miller, 6503, York Road, and F. H. Rhodes, 225, East Mount Pleasant Avenue, Mount Airy, both in Philadelphia, Pa., U.S.A.) International Convention date, August 28, 1919.

Solvent naphtha is treated with sulphuric acid to polymerise the coumarone, indene, &c., and produce a solution of resin in naphtha. The acid is neutralised with alkali and the solution washed with hydrochloric acid and distilled. The neutralisation with alkali may be omitted.

LATEST NOTIFICATIONS.

- 153,558. Asbestos cloth, more especially for the dry separation of solid matter from blast furnace gases and the like. Danhardt, E. October 31, 1919.
153,308. Processes for filling high-pressure vessels with liquefiable gases such as oxygen, nitrogen, hydrogen, air, and the like. Heylandt, Ges. Fur Apparatebau. May 8, 1919.
153,574. Process for effecting the change of lime-nitrogen into urea. Nitrum Akt.-Ges., and Schellenberg. November 7, 1919.
153,579. Extraction and refining of oils and oleaginous substances. Parodi, P. March 20, 1918.
153,587. System and apparatus for the safety storage and distribution of inflammable and other liquids in tanks and pipings in which it is protected from contact with air. Maclere, P. A. P. V. November 7, 1919.

Specifications Accepted, with Date of Application

- 131,897. Molybdenum compounds from yellow lead ores, Extraction of. Deutsche Molybdaen Werke Ges. May 23, 1916.
133,962. Hydrocarbons, Process and apparatus for the continuous treatment of—with liquid sulphur dioxide. April 27, 1915.
134,825. Zinc sulphide ores, Roasting of—preparatory to leaching. Electrolytic Zinc Co. November 7, 1918.
137,036. Ammonia, Methods and apparatus for the oxidation of. C. Toniolo. December 23, 1918.
141,333. Benzoic acid, Manufacture of. Commercial Research Co. April 7, 1920.
153,051. Water gas, Manufacture of. A. Meade. June 28, 1919.
153,053. Gas from blast-furnaces, gas-generating plants, and the like, Apparatus for washing and drying. E. F. Hickman. July 17, 1919.
153,055. Anthraquinone derivatives, Manufacture of. June 21, 1918.

- 153,109. Tar extractors and scrubbers for gas. J. F. Wells. August 7, 1919.
153,113. Basic sulphate of Zirconium, Manufacture of. H. Wade. (Pennsylvania Salt Manufacturing Co.) August 8, 1919.
153,139. Carbonaceous materials, Heating of vertical retorts for the distillation of. J. West, W. Wild, and West's Gas Improvement Co. August 30, 1919.
153,177. Ammonia contained in the gases from coke-ovens, Recovery of. A. E. White. (Soc. Franco-Belge de Fours a Coke.) November 14, 1919.

Applications for Patents.

- Atack, F. W. Manufacture of chloro-amino-anthraquinone. 31,615. November 9.
" Oxidation of aromatic hydrocarbons. 31,971. November 12.
Bader, W. Manufacture of alkyl compounds. 32,037. November 12.
Barnett, W. L. Production of cellulose esters. 31,684. November 9.
British Cellulose & Chemical Manufacturing Co. Manufacture of alkyl compounds. 32,037. November 12.
British Scientific Instrument Research Association. Manufacture of solder. 31,839. November 10.
Chloride Electrical Storage Co. (Smith). Secondary battery plates or electrodes. 32,034. November 12.
Distillers Co. & Meyer, E. A. Process for denaturing alcohol. 31,589. November 8.
Emerson, V. L. Conversion of hydrocarbon oils. 31,555. November 8. (United States, May 6.)
Goodrich Co., B. F. & White, A. E. Vulcanisation of rubber. 31,955. November 11.
Hurst, J. E. Pouring apparatus for centrifugal casting machines. 31,682. November 9.
Imperial Trust for the Encouragement of Scientific and Industrial Research. Production of cellulose esters. 31,684. November 9.
Jones, C. F. & Mather & Platt. Centrifugal or turbine pumps. 32,105. November 13.
Lundén, H. L. R. Production of nitrogen compounds. 30,060. November 12. (Sweden, December 3, 1919.)
Maunoury, P. Process for obtaining cellulose and paper pulp from alfa grass, &c. 32,123. November 13.
Ratner, L. Fixation of atmospheric nitrogen. 31,592. November 8.
Rogers, D. M. Electrolytic apparatus for preparing hypochlorite solutions. 32,039. November 12.
Ros, D. de. Oxidation of metals. 32,116. November 13.
Soutar, C. W. Manufacture of chloro-amino-anthraquinone. 31,615. November 9.
Techno-Chemical Laboratories, Ltd. Recovery of heat from treated material. 32,127. November 13.
Thorssell, C. T. Production of nitrogen compounds. 32,060. November 12. (Sweden, December 3, 1919.)
Wade H. (Buckman & Pritchard). Manufacture of refractory material. 31,587. November 8.

Enemy Patents

It has been officially announced that patents held by Austrian and Bulgarian nationals which were vested in the Public Trustee during the war are now to revert to their former owners. This decision is subject to special conditions in regard to licences which may have been granted by the Board of Trade or the Public Trustee under the temporary War Acts, and in regard to the grant of licences in future.

Making Extract with Glycerine.

It was announced by Dr. M. de Grote, of the University of Pittsburg, at the annual meeting of the American Chemical Society, that a satisfactory extract can be made with glycerine, and therefore the claims of those who maintain that alcohol is necessary in the production of such essences are without foundation. This announcement finds determined negation among chemists at Baltimore.

One of those who take issue with Dr. Grote is F. M. Boyles, chief chemist for McCormick & Co., manufacturers of extracts and many other substances. It is to be said by way of explanation that the heads of this house would be glad to find that some solvent other than alcohol could be effectively used in the making of extracts. Mr. Boyles says that he has exchanged letters with Dr. De Grote, taking issue with him on his theory. Mr. Boyles has made numerous experiments with glycerine, all of which have been more or less failures. He says glycerine holds up fairly well as a preservative, but being an oil itself it makes poor solution, and fails to dissolve satisfactorily the ingredients that are applied to it, besides always imparting the glycerine taste.

Market Report and Current Prices

Our Market Report and Current Prices are exclusive to THE CHEMICAL AGE, and, being independently prepared with absolute impartiality by Messrs. R. W. Greeff & Co. and Messrs. Chas. Page & Co., Ltd., may be accepted as authoritative. The prices given apply to fair quantities delivered ex wharf or works, except where otherwise stated. The weekly report contains only commodities whose values are at the time of particular interest or of a fluctuating nature. A more complete report and list are published once a month. The current prices are given mainly as a guide to works managers, chemists, and chemical engineers; those interested in close variations in prices should study the market report.

Market Report

THURSDAY, November 18.

Unfortunately the markets are distinctly slow and lifeless in tone. Values are exceedingly well maintained, having regard to the circumstances. We look forward to better things after the annual stock taking. The export situation remains unchanged.

General Chemicals

ACETONE is in rather slower demand, but the price is fully maintained.

ACID ACETIC.—Stocks are being steadily absorbed, and the position is gradually becoming rather healthier.

ACID CARBOLIC is in poor demand, but nominally unchanged.

ACID CITRIC remains lifeless.

ACID FORMIC is slow of sale, but there does not seem to be much reduction in price.

ACID OXALIC is in limited inquiry, but the price seems to have found its level for the time being.

ACID TARTARIC has been in much better inquiry, and whilst there is no change in price stocks are much smaller.

BLEACHING POWDER is still in fair export demand, with value unaltered.

COPPER SULPHATE remains in buyers' favour, and in very poor demand.

LEAD SALTS have been rather more inquired for, but very little actual business is passing.

POTASSIUM BICHROMATE is now obtainable on favourable terms, and an improvement in value seems to be inevitable, sooner or later.

POTASSIUM PRUSSATE is in fair inquiry; price unchanged.

SODA ACETATE.—A little more business is reported, and as stocks are not large the article exhibits a rather better undertone.

SODA BICHROMATE.—Most of the forward contracts have now been placed by consumers on the basis of next year's prices as previously indicated.

SODA NITRITE.—Only a small business is passing, and the prices are inclined to be slightly easier.

SODA PHOSPHATE is still hanging fire, but the article is without material change in price.

SODA PRUSSATE.—The recent activity has slowed down somewhat, but the price is distinctly firmer.

Coal Tar Intermediates

This market is without appreciable change during the week, but trade in a number of products has been more satisfactory, and generally speaking prices are well maintained.

ALPHANAPHTHOL is in moderate demand at last quoted price.

BETANAPHTHOL continues in a stagnant condition, but there does not appear to be the same eagerness to sell on the part of secondhands, and it is probable that a number of these parcels are now slowly becoming absorbed.

DINITROCHLOROBENZOLE is in active demand, and the price is very firm.

DIMETHYLANILINE is also in good demand at last quoted figures.

RESORCINE.—The technical article is in fair request and the price is well maintained.

PARANITRANILINE is inclined to be quiet, but the price does not show any reduction.

SALICYLIC ACID is in slightly better demand, but the price continues very low.

Coal Tar Products

There is little change in our market since last week.

BENZOL 90's is scarce, and there are several fairly large inquiries in the market. The price is 3s. 8d. to 3s. 9d. in the

North, and 3s. 10d. to 4s. in the South.

PURE BENZOL remains steady at about 4s. to 4s. 2d.

CREOSOTE OIL is fairly strong and worth 1s. 2d. in the North, and 1s. 3d. in the South.

CRESYLIC ACID remains unchanged at 3s. 9d. to 3s. 11d. for 95/97 per cent. quality, and 4s. 6d. to 4s. 9d. for Pale, 97/99 per cent.

SOLVENT NAPHTHA remains at 3s. on rails.

HEAVY NAPHTHA is worth 3s. 2d. to 3s. 4d.

NAPHTHALENE remains unchanged. Crude qualities range from £14 to £26 per ton, while refined still shows weakness with small business at a price of about £40 per ton.

PITCH.—The market remains unchanged, but there is no change in last week's quotations.

Sulphate of Ammonia

Home Trade prices remain unchanged, but the demand for export is not quite so active, owing to competition from Foreign production.

Current Prices

Chemicals

	per	lb.	s.	d.	to	lb.	s.	d.
Acetic anhydride	ton	90	0	0	to	95	0	0
Acetone oil	ton	120	0	0	to	125	0	0
Acetone, pure	ton	100	0	0	to	105	0	0
Acid, Acetic, glacial, 99-100%	ton	72	10	0	to	75	0	0
Acetic, 80% pure	ton	100	0	0	to	105	0	0
Arsenic	ton	74	10	0	to	76	0	0
Boric, cryst.	ton	0	0	10½	to	0	0	11
Carbolic, cryst. 39-40%	lb.	0	3	6	to	0	3	9
Citric	ton	115	0	0	to	120	0	0
Formic, 80%	lb.	7	3	0	to	0	7	6
Gallic, pure	lb.	0	0	8½	to	0	0	9
Hydrofluoric	ton	58	0	0	to	60	0	0
Lactic, 50 vol.	ton	67	10	0	to	70	0	0
Lactic, 60 vol.	ton	41	0	0	to	44	0	0
Nitric, 80 Tw.	ton	0	1	10	to	0	1	11
Oxalic	ton	65	0	0	to	67	0	0
Phosphoric, 1.5	ton	0	11	6	to	0	11	0
Pyrogallic, cryst.	lb.	0	2	0	to	0	2	3
Salicylic, Technical	lb.	0	2	11	to	0	3	0
Salicylic, B.P.	ton	8	10	0	to	8	15	0
Sulphuric, 92-93%	ton	0	3	6	to	0	3	9
Tannic, commercial	lb.	0	2	6	to	0	2	7
Tartaric	ton	19	10	0	to	20	0	0
Alum, lump	ton	75	0	0	to	77	10	0
Alum, chrome	ton	9	0	0	to	9	10	0
Alumino ferric	ton	17	10	0	to	18	10	0
Aluminium, sulphate, 14-15%	ton	20	10	0	to	21	10	0
Aluminium, sulphate, 17-18%	ton	0	2	2	to	0	2	4
Ammonia, anhydrous	ton	43	0	0	to	45	0	0
Ammonia, .880	ton	30	0	0	to	32	10	0
Ammonia, .920	ton	0	0	7½	to	—	—	—
Ammonia, carbonate	ton	95	0	0	to	100	0	0
Ammonia, chloride	ton	60	0	0	to	65	0	0
Ammonia, muriate (galvanisers) ...	ton	55	0	0	to	60	0	0
Ammonia, nitrate	ton	120	0	0	to	125	0	0
Ammonia, phosphate	lb.	0	3	0	to	0	3	3
Ammonia, sulphocyanide	ton	420	0	0	to	425	0	0
Amyl acetate	ton	80	0	0	to	82	0	0
Arsenic, white, powdered	ton	12	10	0	to	13	0	0
Barium, carbonate, 92-94%	ton	0	0	11	to	0	1	0
Barium, chlorate	ton	27	0	0	to	28	0	0
Chloride	ton	55	0	0	to	56	0	0
Nitrate	ton	30	0	0	to	31	0	0
Barium Sulphate, blanc fixe, dry ...	ton	16	10	0	to	17	0	0
Sulphate, blanc fixe, pulp ...	ton	0	1	6	to	0	1	8
Sulphocyanide, 95%	ton	31	0	0	to	32	0	0
Bleaching powder, 35-37%	ton	41	0	0	to	42	10	0
Borax crystals	ton	20	0	0	to	21	0	0
Calcium acetate, Brown	ton	30	0	0	to	32	0	0
Calcium Carbide	ton	30	0	0	to	32	0	0
Chloride	ton	12	10	0	to	13	0	0

	per	£	s.	d.	to	£	s.	d.		per	£	s.	d.	to	£	s.	d.
Carbon bisulphide.....	ton	65	0	0	to	67	0	0	Benzidine, sulphate	lb.	0	10	6	to	0	11	0
Casein, technical	ton	75	0	0	to	80	0	0	Benzoic acid	lb.	0	4	0	to	0	4	3
Cerium oxalate	lb.	0	3	9	to	0	4	0	Benzoate of soda	lb.	0	4	3	to	0	4	6
Chromium acetate	lb.	0	1	2	to	0	1	4	Benzyl chloride, technical	lb.	0	2	0	to	0	2	3
Cobalt acetate	lb.	0	11	6	to	0	12	6	Betanaphthol benzoate.....	lb.	0	14	0	to	0	14	6
Oxide, black	lb.	1	0	0	to	1	0	6	Betanaphthol	lb.	0	4	0	to	0	4	3
Copper chloride	lb.	0	1	3	to	0	1	6	Betanaphthylamine, technical.....	lb.	0	11	6	to	0	12	6
Sulphate	ton	42	0	0	to	44	0	0	Croceine Acid, 100% basis	lb.	0	5	0	to	0	6	3
Cream Tartar, 98-100%	ton	225	0	0	to	230	0	0	Dichlorbenzol	lb.	0	0	6	to	0	0	7
Epsom salts (see Magnesium sulphate)									Diethylaniline	lb.	0	7	9	to	0	8	6
Formaldehyde 40% vol.....	ton	205	0	0	to	210	0	0	Dinitrobenzol	lb.	0	1	4	to	0	1	8
Formusol (Rongalite)	lb.	0	4	9	to	0	5	1	Dinitrochlorbenzol	lb.	0	1	5	to	0	1	6
Glauber salts	ton	Nominal.							Dinitronaphthalene	lb.	0	1	6	to	0	1	8
Glycerine, crude	ton	70	0	0	to	72	10	0	Dinitrotoluenol	lb.	0	1	8	to	0	1	9
Hydrogen peroxide, 12 vols.	gal.	0	2	9	to	0	2	10	Dinitrophenol	lb.	0	2	9	to	0	3	0
Iron perchloride	ton	50	0	0	to	52	0	0	Dimethylaniline	lb.	0	5	9	to	0	6	0
Iron sulphate (Copperas)	ton	4	0	0	to	4	5	0	Diphenylamine.....	lb.	0	5	0	to	0	5	3
Lead acetate, white	ton	72	10	0	to	75	0	0	H-Acid	lb.	0	14	6	to	0	15	0
Carbonate (White Lead).....	ton	61	0	0	to	63	0	0	Metaphenylenediamine	lb.	0	5	9	to	0	6	0
Nitrate	ton	65	0	0	to	67	0	0	Monochlorbenzol	lb.	0	0	10	to	0	1	0
Litharge	ton	57	0	0	to	59	0	0	Metanilic Acid	lb.	0	7	6	to	0	8	6
Lithopone, 30%	ton	48	0	0	to	49	0	0	Monosulphonic Acid (2.7)	lb.	0	7	6	to	0	8	0
Magnesium chloride	ton	15	10	0	to	16	10	0	Naphthionic acid, crude	lb.	0	5	0	to	0	5	6
Carbonate, light.....	cwt	2	15	0	to	3	0	0	Naphthionate of Soda.....	lb.	0	6	0	to	0	6	3
Sulphate (Epsom salts commer-)	ton	12	10	0	to	13	0	0	Naphthylamin-di-sulphonic-acid...	lb.	0	5	6	to	0	6	6
cial)	ton	18	10	0	to	19	10	0	Nitronaphthalene	lb.	0	1	6	to	0	1	8
Sulphate (Druggists')	ton	18	10	0	to	19	10	0	Nitrotoluenol	lb.	0	1	3	to	0	1	4
Manganese, Borate.....	ton	190	0	0	to	—			Orthoamidophenol, base.....	lb.	0	18	0	to	1	0	0
Sulphate	ton	130	0	0	to	135	0	0	Orthodichlorbenzol	lb.	0	1	1	to	0	1	2
Methyl acetone	ton	95	0	0	to	100	0	0	Orthotoluidine	lb.	0	2	6	to	0	2	9
Alcohol, 1% acetone	gall.	Nominal.							Orthonitrotoluenol.....	lb.	0	1	3	to	0	1	4
Nickel sulphate, single salt	ton	60	0	0	to	62	0	0	Para-amidophenol, base	lb.	0	12	6	to	0	13	0
Nickel ammonium sulphate, double									Para-amidophenol, hydrochlor	lb.	0	13	0	to	0	13	6
salt	ton	62	0	0	to	64	0	0	Paradichlorbenzol	lb.	0	0	6	to	0	0	8
Potassium bichromate	lb.	0	1	6	to	0	1	7	Paranitraniline	lb.	0	8	0	to	0	8	3
Carbonate, 90%	ton	105	0	0	to	110	0	0	Paranitrophenol	lb.	0	2	9	to	0	3	0
Chloride	ton	50	0	0	to	52	0	0	Paranitrotoluenol	lb.	0	5	9	to	0	6	0
Chlorate	lb.	0	0	9½	to	0	0	10½	Paraphenylenediamine, distilled ...	lb.	0	13	6	to	0	14	6
Meta bisulphite, 50-52%	ton	225	0	0	to	230	0	0	Paratoluidine	lb.	0	8	6	to	0	9	6
Nitrate, refined	ton	65	0	0	to	67	0	0	Phthalic anhydride	lb.	0	4	9	to	0	5	0
Permanganate	lb.	0	3	6	to	0	3	9	R. Salt, 100% basis	lb.	0	4	0	to	0	4	2
Prussiate, red	lb.	0	4	0	to	0	4	3	Resorcin, technical	lb.	0	11	6	to	0	12	6
Prussiate, yellow	lb.	0	2	0	to	0	2	1	Resorcin, pure	lb.	0	17	6	to	0	18	0
Sulphate, 90%	ton	31	0	0	to	33	0	0	Salol	lb.	0	5	3	to	0	5	9
Salammoniac, firsts	cwt.	5	10	0	to	—			Shaeffer acid, 100% basis.....	lb.	0	3	6	to	0	3	0
Seconds	cwt.	5	5	0	to	—			Sulphanilic acid, crude	lb.	0	1	8	to	0	1	9
Sodium acetate	ton	50	0	0	to	52	0	0	Tolidine, base	lb.	0	10	6	to	0	11	6
Arsenate, 45%	ton	60	0	0	to	62	0	0	Tolidine, mixture	lb.	0	3	0	to	0	3	6
Bicarbonate	ton	10	10	0	to	11	0	0									
Bichromate	lb.	0	1	2	to	0	1	3									
Bisulphite, 60-62%	ton	47	10	0	to	50	0	0									
Chlorate	lb.	0	0	5½	to	0	0	5½									
Caustic, 70%	ton	31	0	0	to	32	0	0									
Caustic, 76%	ton	32	10	0	to	33	0	0									
Hydrosulphite, powder, 85%	lb.	0	4	6	to	0	4	10									
Hyposulphite, commercial.....	ton	35	10	0	to	37	10	0									
Nitrite, 96-98%	ton	75	0	0	to	77	0	0									
Phosphate, crystal.....	ton	41	0	0	to	42	0	0									
Perborate	lb.	0	2	2	to	0	2	4									
Prussiate	lb.	0	1	2½	to	0	1	3½									
Sulphide, crystals	ton	25	0	0	to	27	0	0									
Sulphide, solid, 60-62%	ton	45	0	0	to	47	0	0									
Sulphite, cryst.	ton	17	10	0	to	18	10	0									
Strontium carbonate	ton	85	0	0	to	90	0	0									
Strontium Nitrate	ton	90	0	0	to	95	0	0									
Sulphate, white	ton	8	10	0	to	10	0	0									
Sulphur chloride	ton	42	0	0	to	44	10	0									
Sulphur, Flowers	ton	19	0	0	to	19	10	0									
Roll	ton	19	0	0	to	19	10	0									
Tartar emetic	lb.	0	3	0	to	0	3	2									
Tin perchloride, 33%	lb.	0	2	6	to	0	2	7									
Perchloride, solid	lb.	0	3	0	to	0	3	3									
Protochloride (tin crystals)....	lb.	0	2	0	to	0	2	1									
Zinc chloride, 102 Tw.	ton	22	0	0	to	23	10	0									
Chloride, solid, 96-98%	ton	60	0	0	to	65	0	0									
Oxide, 99%	ton	56	0	0	to	57	0	0									
Dust, 90%	ton	90	0	0	to	92	10	0									
Sulphate	ton	21			to	23	10	0									

Coal Tar Intermediates, &c.

Alphanaphthol, crude	lb.	0	4	0	to	0	4	3
Alphanaphthol, refined	lb.	0	5	0	to	0	5	3
Alphanaphthylamine.....	lb.	0	3	6	to	0	3	9
Aniline oil, drums extra	lb.	0	1	8	to	0	1	9
Aniline salts	lb.	0	1	10	to	0	2	0
Anthracene, 85-90%	lb.	—			to	—		
Benzaldehyde (free of chlorine)....	lb.	0	5	9	to	0	6	0
Benzidine, base	lb.	0	13	6	to	0	14	0

Cardiff By-Products Market

Sulphate of Ammonia—	
For home consumption (per ton o.t.) ..	£25 net d./d.
For export (per ton f.o.b.)	£30 to £40
Benzol, 90's (per gallon)	3s. 5d. to 3s. 10d.
Benzol, 50's (per gallon)	3s. 5d.
Solvent naphtha (per gallon)	3s. 4d. to 3s. 6d.
Heavy naphtha (per gallon)	3s. 3d. to 3s. 4½d.
Crude naphthalene salts (per ton)	£16 to £26
Pitch (per ton)	200s. to 230s.
Creosote (per gallon)	1s. 2d. to 1s. 4d.
Motor benzol (per gallon)	3s. 5d. to 3s. 10d.
Crude benzol (per gallon)	1s. 9d.
Toluol (per gallon)	4s.

Zinc Concentrates

THOUGH the settlement of the Broken Hill strike was naturally received with great satisfaction by the spelter industry in South Wales, which relies to a considerable extent on Australia for its zinc concentrates, the depressed conditions prevailing for some time, which have resulted in the closing of the principal Welsh spelter works, are likely to continue for an indefinite period. The Broken Hill dispute, beginning in May of last year, exercised an adverse influence on the industry, but what has really closed the Welsh works is the serious competition of Belgium and America. Unless freights and costs come down it does not appear that Welsh smelters will find it remunerative to produce at present market values. In the case of Belgium, lower labour rates are said to be the chief factor in the cheapness of the product, while as regards America the position of the exchange is all in their favour. The suggestion is put forward that the Board of Trade should in some way come to the rescue of this key industry, in which, of course, the Government has a direct interest in view of the contract entered into with Australia, whereby Britain buys 100,000 tons of concentrates from the Commonwealth for the next 11 years at a total price of twenty-five millions.

Company News

CHLORIDE ELECTRICAL STORAGE.—An interim dividend of 5 per cent. actual, tax free has been declared.

VAR OIL & COAL.—The issued capital of this company is £600,000, in fully paid £1 shares, and the properties comprise 3,411 acres. The company is in the development stage, and the acquisition of more important areas is contemplated.

BRITISH AMMONIUM CO.—This company has been registered with a nominal capital of £100,000 in £1 shares, to adopt an agreement with A. Rollason for the acquisition of an invention relating to the manufacture of ammonia, and all British, foreign, and colonial rights for the same.

MAYPOLE COMPANY.—The directors' report for 1919 contains regrets at the continuance of the difficulties in obtaining dyes of the requisite qualities and shades. Arrangements have been made for better supplies in the future. A net profit of £798 for the year was shown on the accounts. This reduces the debit balance brought in to £5,477.

BARNAGORE JUTE FACTORY.—Profit for the year to August 31 after making provision for depreciation is £113,326, and £630 was brought in, making £113,956. After paying preference dividend, the directors propose a further dividend of 20 per cent. on ordinary shares, making 35 per cent. for the year. Directors' fees amounted to £6,811, and £895 was carried forward. The customary rate of 1s. 4d. per rupee in converting the Indian accounts into sterling is retained.

ANGLO-UNITED OILFIELDS.—At the forthcoming meeting the directors, according to the report, will not submit a balance sheet. The production of oil only began last April. December 31 has been decided upon as the date on which annual accounts will close. An extraordinary general meeting will be held, after the ordinary general meeting, to sanction increasing capital from £225,000 to £350,000 by creating 125,000 £1 additional shares, of which 75,000 are to be issued immediately to shareholders at par.

GALICIAN OIL TRUST (in liquidation).—At a meeting to be held on November 24, the Liquidator will ask for confirmation of an agreement recently executed (subject to the approval of the creditors and shareholders) which provides for the sale of the whole of the assets to a new company. He has decided, in the event of the agreement being confirmed, to accept for registration between November 25 and December 9 transfers of shares which have been executed since the company went into liquidation.

UNITED OIL AND REFINERY.—On his return from the United States Mr. Campbell M. Hunter made a report which is now being issued by the directors of the United Oil and Refinery Co., Ltd. The report says: "In spite of no material benefit having yet been derived from expenditure incurred up-to-date in the refinery, the net trading profits have been most satisfactory. As alterations are being made in the refinery to enable a larger range of the more valuable products to be manufactured, it is only reasonable to expect an expansion in the net profits once the plant has been reconstructed. Market conditions at the moment are uncertain, but during the past summer, in spite of the most trying conditions, remarkable profits have been earned. With prices on a normal basis, and when the refinery alterations are completed, Mr. Hunter sees no reason why the profits forecast in the prospectus should not be realised."

LEVER BROTHERS.—Offers for the sale of 4½ million 20 per cent. Cumulative Preferred Ordinary shares of 5s. cash at 10s. 9d. per share have been invited by a Lever Brothers, Ltd., prospectus. The shares rank for dividends as from November 1, 1920, and form part of six million shares (£1,500,000) already issued and fully paid. At the price of issue the yield is £9 6s. 1½d. per cent. The shares have been acquired by the British, Foreign, and Colonial Corporation, Limited, from Lewis & Harris Welfare and Development Company, Limited, of which company Lord Leverhulme is chairman. Lever Brothers paid dividends for 1918 and 1919 of 17½ per cent., and for 1919 the sum of £500,000 was placed to special reserve. For the half-year ended June 30 last an interim dividend at the rate of 20 per cent. per annum was declared on the Ordinary shares. The directors of Lever Brothers anticipate that the available profits for the current year will be sufficient to maintain this rate of Ordinary dividend after making ample provision for reserves.

PHOENIX OIL AND TRANSPORT.—On Monday the Phoenix Oil and Transport Co., Ltd., held its statutory meeting, the chairman, Mr. Edward Manville, M.P., presiding. The meeting was convened merely to submit the statutory report, but as it was the wish of the board the chairman gave a description of the progress of the company to date. He said the company was formed to acquire as far as possible the whole share interests in the Anglo-Roumanian Petroleum Co., Ltd., Traian Roumanian Oil Co., Ltd., Becin (Roumania) Oil Fields, Ltd., and Stavropoleo Moreni (Roumania) Oil Properties, Ltd. In addition the whole of the undertakings and properties of the Anglo-Continental Oil Co., Ltd., and the Masterson Roumanian Oil Syndicate, Ltd., were acquired. The management of the company in Roumania was in the hands of a local committee with Capt. Masterson as its head as the technical general manager, and composed, in addition, of Mr. Lacey, the commercial manager; Dr. Frederick Bossel, the eminent Roumanian chemist; and Dr. Ionescu, who was a lawyer. The extensive drilling programme foreshadowed in the prospectus was well under way. Rapid progress was being made to restore the refinery to the condition it was in before its destruction in 1916. It was the desire of the directors to extend operations into other oil-producing countries outside of Roumania, so that the future interests of the company may be diversified and not confined to one country alone.

MAGADI SODA.—Mr. Samuel Samuel, M.P., presided at the ninth ordinary general meeting of Magadi Soda Co., Ltd., on Monday. Profit and loss account showed a debit of £96,832, while the accounts accounts showed that £20,393 had been paid out of this for interest on debentures, and there was an item of £25,412 difference in exchange. A shareholder said the financial position was really much worse than it seemed at first sight, because although the debit balance last year was £96,000, a debit was shown to profit and loss account to date of £197,000, that was after taking credit for nearly £160,000 of assets, which were really nothing more or less than expenses, and were absolutely a loss; there were £114,000 expenses of issue; £17,000 preliminary expenses, and £20,000 for debentures issue expenses. The chairman said the directors regretted the result. He pointed out that production started on Nov. 11. He hoped they had now entered upon a period of prosperity which had been so long waited for. They had unlimited supplies of soda, and if only the machinery which they had so carefully selected and investigated proved to be what they anticipated he thought the shareholders who had been so patient will soon have every reason to congratulate themselves.

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

LOCALITY OF FIRM OR AGENT.	MATERIALS.	REF. NO.
Canada ...	Glue	643
New Zealand	Oils; paints; patents; druggists' sundries.	646
Roumania ...	Aniline dyes; hides and skins; fish oil and bone oil.	657
Zurich ...	Heavy and light chemicals; drugs	660
Madrid ...	Sulphate of ammonia; jute; oil seeds; grease and oil.	658
Paris ...	Chemical products; raw materials	684
Canada ...	Heavy chemicals	—
Stockholm ...	Acetone; methyl; amyl-alcohol; fusel oil; pure alcohol; chemicals for paper factories	688
Thahvil Canton, Zurich	Pharmaceutical chemicals ...	692
Belgium ...	Oils; fats	—
Philippine Islands	Paints; oils	703
Kobe (Japan)	Paper; pulp; chemicals; dye-stuffs	694
Philadelphia...	Vegetable oils; chemicals ...	697

